REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY *(Leave blank)*	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	May 1, 1996	Final - 9/12/94 - 4/1/96

4. TITLE AND SUBTITLE
MAP Project
Multimedia Access Prototype (MAP) Project

5. FUNDING NUMBERS
Grant
MDA972-94-1-0014

6. AUTHOR(S)
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7. PERFORMING ORGANIZATION NAMES(S) AND ADDRESS(ES)
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8. PERFORMING ORGANIZATION REPORT NUMBER
MAP1

9. SPONSORING / MONITORING AGENCY NAMES(S) AND ADDRESS(ES)
Advanced Research Projects Agency (ARPA)
3701 North Fairfax Avenue
Arlington, VA 22203-1714

10. SPONSORING / MONITORING AGENCY REPORT NUMBER
Not Known

11. SUPPLEMENTARY NOTES
N/A

a. DISTRIBUTION / AVAILABILITY STATEMENT
No Restrictions

12. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

The Multimedia Access Project (MAP) project was the result of a grant from the Advanced Research Projects Agency. The project created a user-friendly, multimedia-based prototype that increased accessibility to the government's geographic information databases. The project was a test bed evaluation of distributed and collaborative access to open source government information. The results of the initial test bed evaluation were to assess and validate likely standards for use in DoD, government, public and commercial services.

OBJECTIVE:

The following are the stated objectives for this project:

(1) Provide information technology support to government agencies for crisis planning applications.
(2) Provide the AIM Institute with the local infrastructure required to participate in the National Information Infrastructure (NII).
(3) Deploy new technologies for presenting selected geographic data in a multimedia presentation format.
(4) Distribute the geographic information over a broadband network to a substantial population.
(5) Assess and validate likely standards for use in DoD, government, public, and commercial information service systems.
(6) Prepare for further commercial development and generalization of such systems and services.
(7) Collect evaluation data.
(8) Evaluate the test.
(9) Provide public access to all evaluation data.

14. SUBJECT TERMS
Multimedia, geographic information databases, open source government information broadband test bed

15. NUMBER OF PAGES
103

16. PRICE CODE
N/A

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	

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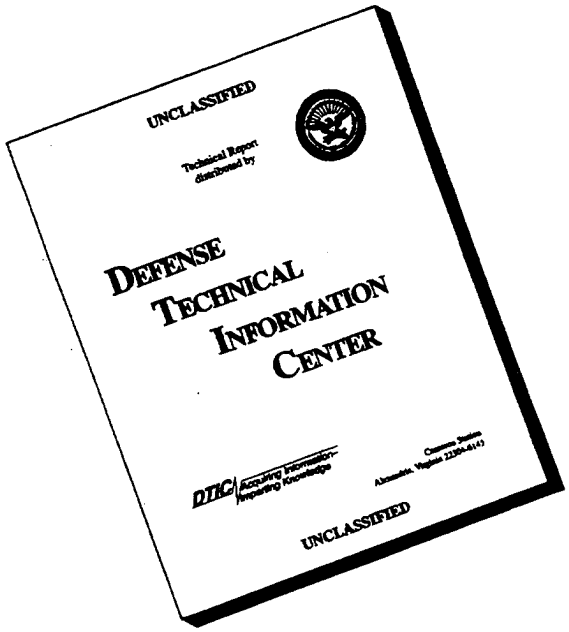

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I. INTRODUCTION

A. Final Report Requirement

This report details the final development steps and the results of the Multimedia Access Prototype (MAP) project produced under ARPA Grant MDA 972-94-1-0014. The report fulfills the requirement for a final report as detailed in the grant specifications.

The emphasis of this report is on the final development stages of the prototype and the overall evaluation of the project. Information and documentation that has already been submitted as a part of the three previous quarterly status reports has not been duplicated for this final report.

B. Outline of the Original Proposal

The AIM Institute received ARPA Grant MDA 972-94-1-0014 effective September 12, 1994 to demonstrate the presentation and to evaluate the distribution of geographically related data in a multimedia format for government organizations like the Department of Defense (DoD). This effort was to employ state-of-the-art enabling technologies to create an integrated geographic decision support system capable of searching public and private databases for data relevant to the inquiry, converting this data into usable, organized information, and presenting this information in a visually enhanced, interactive format. Aesthetically pleasing and intuitive in nature, the interface was to provide comprehensive, accurate, and timely information to government decision-makers and, eventually, the general public.

Specific DoD programs that have expressed a need for geographical information include the Joint Task Force's (JTF) Advanced Technology Demonstration (ATD) as well as the Defense Mapping Agency's (DMA) Geographic Information Dissemination Initiative across the National Information Infrastructure (NII).

The project was to be a test bed for the evaluation of distributed and collaborative access to open government sources. Test bed results would help in the recognition, assessment, and validation of standards for use in government, public, and commercial information services systems. Also, the project would test the technical feasibility and market demand for the deployment of interactive information service technology over US WEST's broadband-to-the-home network serving 45,000 homes in Omaha, Nebraska. The results of the test bed were to be used to determine the possibility for expanded development and distribution of user-friendly decision support systems.

C. Project Objectives

The following are the stated objectives for this project:

1. Provide information technology support to government agencies for crisis planning applications.

2. Provide the AIM Institute with the local infrastructure required to participate in the National Information Infrastructure (NII).

3. Deploy new technologies for presenting selected geographic data in a multimedia presentation format.

4. Distribute the geographic information over a broadband network to a substantial population.

5. Assess and validate likely standards for use in the DoD, government, public, and commercial information service systems.

6. Prepare for further commercial development and generalization of such systems and services.

7. Collect evaluation data on:
    a. queries received from users
    b. response, latency, and transmission times
    c. system and source failures
    d. user (accessors) satisfaction levels

8. Evaluate the test.

9. Provide public access to all evaluation data.

D. Project Schedule

The original timeline called for the completion of the MAP project by the end of the term of the grant, September 11,1995. On June 28, 1995, a request was made for a no-cost extension for the grant until December 1, 1995. This request was made to the Project Officer, Dr. David Gunning and was granted. The period of performance was again extended through April 1, 1996. Copies of the letter requesting the grant extension and the documents approving the no-cost extension are included in *Appendix A - Final Timeline*.

A final project schedule showing major milestones can be found in *Appendix A*.

E. Minutes of MAP Team Meetings

Appendix B contains minutes of the MAP Team meetings that have been held since submittal of the last quarterly status report. (i.e. minutes of meetings held since June 30, 1995).

II. PROGRESS TOWARD OBJECTIVES - FINAL REPORT

A. Principal Investigators Final Report

A TV and a PC version of the MAP prototype were both completed in time to be demonstrated at the ARPA/SISTO Symposium, August 28 through the 31, 1995 in Chantilly, Virginia.

Feedback from visitors to the MAP demonstration area was generally positive, with the most interest coming from individuals working in the areas of distance learning and crisis planning. The majority of the comments centered on the interface design and its ease-of-use characteristics.

The experience that was gained and the input that was received during the ARPA symposium demonstrations served as the basis for one final design iteration on the PC version of the prototype. Enhancements and changes were discussed and contracts for systems integration and interface design were amended to accommodate the additional work.

The PC version of the Map prototype was "provisionally" finished on November 30, 1995. This redesigned version provides navigation and access to three different demonstration information paths. These paths are shown in the diagram in *Appendix C - MAP Navigation*.

The redesigned PC version is powerful, robust, and meets the specified objectives set forth at the beginning of the project.

This prototype contained one software problem that was corrected. A memory error occurred every thirteenth mouse-click causing the system to lock-up. Our existing interface and systems integration team was unable to solve this problem, and so programming consultants were brought on to take a fresh look at the defect. With their help, the problem was identified and resolved before the 60 day deadline of January 30, 1996.

Market testing and evaluation of the redesigned version of the PC prototype has not been completed. It is anticipated that market testing will be an ongoing process utilizing in-house and volunteer resources to design, conduct, and evaluate the functionality of the system.

As ARPA has reorganized and de-emphasized dual-use initiatives, additional follow-on funding from ARPA does not appear to be available. Therefore, our current plans are to pursue commercial and foundation funding for the next version of the MAP prototype.

Enhancements to the next version of the PC prototype will include:

1. Incorporation of intelligent agents that can search heterogeneous databases for requested information,

2. Modification of the PC prototype for use over a broadband network,

3. Further incorporation of off-the-shelf analysis and presentation tools.

Both the TV version and the PC version are mounted on equipment located at the AIM Institute. Arrangements for demonstrations of the capabilities of the two systems can be made by contacting Doug Perry at the AIM Institute.

The current version of the PC prototype was demonstrated publicly at the Omaha New Media Expo on January 30 and 31, 1996 in Omaha, Nebraska.

The original project objectives are outlined in Section I, Subsection C. An evaluation of the success of the MAP Project relative to the original objectives follows:

Objective 1: Provide information technology support to government agencies for crisis planning applications.

Result: We have designed and constructed a prototype of a viable, easy-to-use crisis planning and management information system using off-the-shelf hardware and software. The prototype was brought on-line within the original one-year development schedule and under the proposed budget. *Objective 1* has been accomplished.

It should be noted, however, that new developments in Internet technology - most notably the extremely rapid growth of the World Wide Web - have eclipsed the need for a system such as MAP. Future efforts need to be directed to providing hypertext links to existing open government information in order for that information to be accessible and usable on the world-wide-web. Also, the cataloging and indexing of existing information should be a high priority. (See *Objective 5*)

Objective 2: Provide the AIM Institute with the local infrastructure required to participate in the National Information Infrastructure (NII).

Result: The AIM Institute has been unsuccessful in efforts to recruit a full-time Principal Investigator and a Research Associate in conjunction with this grant. The recruiting process suffered from the overall national shortage of skilled technical professionals, from Omaha's low profile as a technology center

(and hence a perceived negative image associated with a career move), and from the uncertainty of continued funding for the MAP initiative.

Additionally, as a business consortium, the AIM Institute does not have ready access to a pool of technically trained researchers and graduate students. This factor was underestimated in the initial rationale for the Principal Investigator search.

The AIM Institute did use contract resources and student interns to develop the prototype and has enhanced its internal project management skill set as a result of this grant. However, *Objective 2* was not satisfactorily accomplished.

Objective 3: Deploy new technologies for presenting selected geographic data in a multimedia presentation format.

Result: The TV prototype was designed using "pre-alpha" version software tools created by US WEST Advanced Technologies for the delivery of content over the broadband-to-the-home trial. Hardware for the TV version consisted of a mix of standard platforms (e.g. Apple PowerPC server) and proprietary systems such as 3DO's video server and Scientific Atlanta's set-top box.

The PC prototype was designed using "off-the-shelf" hardware and software components, configured to perform the information search, retrieval and presentation functions. PC version hardware consisted of a Sun server and a Compaq Pentium client. The software core consisted of an Oracle database with a navigational front-end developed from Macromedia's Authorware tool set. Considerable custom code was written to achieve connectivity and compatibility between the database and the navigational interface.

With the exception of the work done using the US WEST proprietary software and hardware, new technologies for presenting information were not deployed. However, much time and effort was spent in developing new ways to index, sort, and display selected information in the most straightforward and compelling manner. Therefore, *Objective 3* was partially achieved.

Objective 4: Distribute the geographic information over a broadband network to a substantial population.

Result: The TV version of the prototype was developed with the assistance of the US WEST Advanced Technologies group in Boulder, Colorado. A working demonstration was designed and completed by August, 1995. However, at the same time that the prototype was being developed, US WEST scaled back their market trial plans to focus primarily on analog video programming. Plans for the testing of new services such as home shopping, interactive education and information delivery were put on hold. In March, 1996, US WEST dropped its

interactive TV test in Omaha, saying that service would cost more than what consumers would be willing to pay. (See article in *Appendix A*) Therefore, we have been unable to test the delivery of our content over the actual broadband network.

Nevertheless, as we became familiar with the technologies deployed in the Omaha broadband trial, it became apparent that our concept of interactive retrieval of government information over such a network would be severely limited. The hardware and software configuration being used by US WEST does not have the functionality required for a truly robust information management system. Once these limitations were understood, our development emphasis shifted from the TV version to the PC version. It should be noted, however, that US WEST could pursue a "broadband PC" product offering, which would make the PC version of the MAP prototype a candidate for trial on the broadband network. Thus, *Objective 4* was not accomplished.

Objective 5: Assess and validate likely standards for use in the DoD, government, public, and commercial information service systems.

Result: One of the major achievements of the MAP initiative was the development of a concise and usable structure for indexing and cataloging information using a geographic metaphor as the navigational tool for searching through the information. The information structure created by the MAP team is described in detail in the CONOPS Manual (see the 3rd Quarter Progress Report for a complete copy of the CONOPS). This structure can serve as a foundational tool for organizing data for any type of information service.

It is apparent that the World Wide Web of the Internet will become the foundation for the electronic distribution of information. At the beginning of the MAP Project, the Internet was used primarily by scientists, educators, and technophiles. The development of Internet navigational tools (i.e. Netscape Navigator) and of the growth of the World Wide Web, has opened the Internet to the general public. These new commercial technologies will undoubtedly become the standards for general use in all sectors. *Objective 5* was partially accomplished.

Objective 6: Prepare for further commercial development and generalization of such systems and services.

Result: The AIM Institute has developed an understanding of the market demand for information services and a detailed knowledge of the technical operating characteristics of current and proposed information distribution systems as a result of this initiative.

The AIM Institute and its consortium partners will continue to explore public and private applications for the MAP prototype. *Objective 6* has been accomplished.

Objective 7: Collect evaluation data on:

a. queries received from users
b. response, latency and transmission times
c. system and source failures
d. user (accessors) satisfaction levels

Result: A large-scale user evaluation of the MAP Prototype has not been undertaken. As previously noted, US WEST's change of plans has made the evaluation of the TV version impossible.

We were unable to complete a market evaluation of the PC version during the term of the grant. However, we plan to demonstrate the completed PC version to many different audiences and record feedback on features, functionality, and performance. *Objective 7* was not satisfactorily completed.

Objective 8: Evaluate the test.

Result: This report serves as a project evaluation. Testing and evaluation of the two versions of the prototype remains an ongoing process. *Objective 8* has been partially completed.

Objective 9: Provide public access to all evaluation data.

Result: Information on the MAP Project has been available over the Internet at the AIM Institute home page (http://www.omaha.org). Additionally, a project summary has been submitted and displayed at the ARPA web site (http://www.arpa.mil/sisto/project-sum.html). A copy of the project summary submitted to the ARPA Website is included as *Appendix D*.

The complete project files along with the hardware and software purchased as a part of this initiative are available for inspection or viewing at the AIM Institute, 1314 Douglas On-The-Mall, Omaha, Nebraska. *Objective 9* has been completed.

B. Final Reports from Individual Groups

Individual reports have been received from participants of the different development teams. These reports are included here in their entirety and in the following order:

1. Systems Integration
2. Marketing Research
3. Multimedia Presentation Technologies
4. Geographic Information Systems Technology

Following is the Multimedia Access Prototype (MAP) quarterly report, ending December 1, 1995, for Science Applications International Corporation (SAIC).

SAIC initially participated in two of the four areas on the MAP Project--Geographic Information Systems (GIS) and Systems Integration. Participation was redirected in July 1995. At that time, SAIC's scope was expanded to include development of a Data Server and the GIS/SI roles were redefined via contract modification #1.

Geographic Information Systems (GIS)

During this quarter of the MAP Project, SAIC continued to identify, download, and archive video, audio, textual and image data using the World Wide Web. As information was collected, it was translated into the correct format. Metadata information was then entered into a PC ACCESS database. The ACCESS database was then loaded into the SUN based, ORACLE MAP server. This GIS team also assisted in quality control of the data and MAP testing.

Systems Integration

During this quarter of the MAP Project, SAIC's efforts were focused primarily on creating the interface between the GIS database and the multimedia front end.

The first milestone in the fourth quarter of this project was to show a usable prototype at the ARPA symposium. The programming that allowed us to complete this milestone was accomplished during the six weeks prior to the symposium.

In order to demonstrate a prototype at the ARPA symposium, several pieces of equipment were purchased. This included an ORACLE database, a C compiler, and a 4.2 GB drive. This equipment allowed SAIC's development team to structure and populate the database and write the code needed for the server interface.

Regarding the ORACLE database, we first determined how Studio 23 would query our database. With the client development station located in the Studio 23 facilities, the first thought was to link the client and server via the Internet. Studio 23 ordered a NFS mounting product in order to facilitate this; however, due to security constraints on the SAIC network, it was decided to develop the system in the SAIC lab. In this way, the server and the client development stations were both on the same local area network (LAN).

SAIC had originally created the MAP database in ACCESS. This database required importing into ORACLE. The SAIC staff set up ORACLE and then transferred the data into a working directory. After several false starts and overcoming difficulty in technical communications with the vendor, this was accomplished.

A major step in the project was to create transactional processes between the front end and the server and to decide how the data would be accessed. The transactional processor was written by SAIC and the communications application program interface (API) was jointly developed by SAIC and Studio 23. A UNIX cron job (a chronologically spawned job) was also written that allowed the prototype to pull down data from the Internet to automatically update information. This is useful when the Internet address for the information is static.

In addition to the query building requirement described in the paragraphs above, the server communicates with the Studio 23 client process via a TCP/IP network. In the first phase of development, this was accomplished by using UNIX sockets on the server side and a version of Windows sockets on the client side. Sockets are an Applications Program Interface (API) that allow applications in a client/server environment to communicate with one another. A usefully analogy for understanding how sockets work is to view them as files. The primitives for sockets are open, close, read and write. In the instance of this development effort, the server code performed an open socket command, which would sit and wait for the client machine to request a connection, or in keeping with the file analogy, waited for the client machine to request permission to read and/or write to/from the server. Once a connection was established, the client sent the server the parameters needed to build the SQL query statement. Upon receiving the query results back from the Oracle database, the server opened three files, one for writing the resulting file descriptions, one for writing the media types and one for writing the path where each media file is stored. To signal to the client that the results had been returned, a FLAGFILE was created which the client looped for until it was created.

We also needed a logical break point for each continental area. This was important for the navigational paths associated with the prototype. An AIM Institute intern, who was on-site at SAIC, constructed a listing of countries by continental area in order to provide the constraints needed to complete the navigational paths.

The ARPA symposium provided significant insight into ways to improve the prototype, such as:

1. Completion of prototype features:
   - Create a smaller display area to allow smaller file and executable sizes.
   - Embed media objects. All the media data objects should be loaded into the ORACLE database as ORACLE database objects. The server would then be able to retrieve the files from the database and store them in individual files relative to the media types of each.
   - Verbose execution mode for the server. This would allow the server to run with or without the verbose mode and to store all or portions of the verbose mode output to a user specified file. The benefit of the verbose execution mode is that it would make the user aware of any errors that occur, what database transactions are occurring and what file manipulation is occurring. This transitioned into providing message boxes for the errors, and cursor changes when the user must wait for a response on the client.
   - Additional features created include a printing capability, ability to download files from the server, and the addition of email.
   - Baseline the media. Audio and image conversion utilities were compiled, tested and implemented into the server code. It was then tested by loading heterogeneous media types into the ORACLE database and having the client demonstration system request and display the files.
   - Remote Procedure Call (RPC). The server should run using RPCs and a UNIX RPC client. The code for RPCs is more complex than sockets, however it is easier to debug and maintain. Therefore server code would be reduced by at least 30%, which would improve the maintainability of the server. It would require less setup time and reduced system crashing due to communication errors.

The desire to make RPCs work was very strong; however, after many hours of work, it was decided that RPCs would not work and that socket libraries would have to be used. In this phase two of the server development, a more robust implementation of the sockets API was used. No longer were the socket calls one way, from the client to the server. Instead, a two way virtual connection between the client and server was established. This eliminated the need for the previously developed FLAGFILE and the three files that the server opened for writing the file descriptions, writing the media types, and writing the storage path. Instead, the results from the server were sent directly back to the client via the virtual connection.

2. Identification and recommendation of the hardware/software configuration AIM Institute would need to purchase in order to maintain and run the MAP prototype. To complete this project, once the equipment arrives, SAIC will work with the AIM Institute staff to configure their equipment, transition the software and train their users (contract modification #2, pending).

   A brief description of the server design requirement follows:

   The requirement of the server is to take a list of parameters, currently 15 although the number varies by a parameter or two depending on the functionality required by the server, from the client and produce an SQL query language sentence to be used to query the ORACLE database. There are 15 primary parameters that the server receives: 1. continent, 2. country, 3. region, 4. locality, 5. major category, 6. minor category, 7. subcategory 1, 8. subcategory 2, 9. text, 10. audio, 11. video, 12. image, 13. other media type, 14. filename, 15. description. All variables except for items 9 through 13 are text strings. Items 9 through 13 are Boolean "true" or "false" variables specifying whether or not each particular media type exists in the database. All 15 of the parameters are initialized to a value of "NULL", or an empty set, if they are character strings and 0, or false, if they are Boolean variables. The building of the SQL statement is then done conditionally depending on the values of the parameters. For example, if the filename variable is passed as a value of "NULL" and one of the media types is set to "true" this directs the server to build a query to find all the descriptions of files with the signified media type.

   Once the query has been built, the server connects to the oracle database and passes it the conditionally built query statement. The server retrieves the results of the query from the database and stores them in a "C" language data structure. The execution of the server from this point on is dependent on the phase of development.

3. Test the final MAP product. SAIC thoroughly tested the PC and MAP server. As bugs were identified, SAIC assigned assets and coordinated with Studio 23 to complete revisions.

4. Provide demonstrations. SAIC provided several MAP client/server demonstrations.

AIM-MAP PROJECT

Creighton University Quarterly Report

July - September 1995

Includes report for the ARPA/AIM-MAP contract extension

October - November 1995

This is the final quarterly report for the AIM-MAP project. The first report covered January-March; the second report covered April-June; this report covers July-September, and the ARPA/AIM-MAP contract extension for October-November, 1995.

In September, the Creighton University group arranged to conduct marketing research with focus groups composed of individuals who live in the US West broadband test area in Omaha, Nebraska. We organized focus groups composed of individuals who had participated in the product pre-design focus groups in February. The planned purpose of the September sessions was to obtain information regarding participant reaction to the television- and computer-based products which had been developed during the AIM-MAP project.

Numerous sessions were scheduled at the Science Applications International Corporation facility for the weekend of September 8, 9, and 10. Reminder/ confirmation letters, with directions to SAIC, were mailed on Tuesday, September 5.

On the night of September 5, we received a request from Doug Perry to cancel the focus groups, or to postpone them until modifications could be made to resolve hardware problems that had occurred the previous week during the ARPA symposium in Washington, D.C. We immediately contacted all participants and postponed the sessions until further notice.

ARPA granted an extension (until the end of November) for the AIM-MAP project. However, at the time of the due date for this report, we have not been asked to reschedule the focus groups. Accordingly, we plan to contact the focus group participants to inform them that the sessions have been cancelled, and to express our appreciation for their involvement.

CREIGHTON UNIVERSITY

Eugene C. Eppley
College of Business Administration

October 30, 1995

Mr. Douglas Perry
Applied Information Management Institute
1314 Douglas On-the-Mall
Omaha, NE 68102

Dear Doug:

Enclosed are copies of the Quarterly Report and Final Report for the Creighton University efforts in support of the AIM-MAP project.

We learned a great deal from our involvement in the project. Please contact me if you have any questions regarding the reports.

Sincerely,

John M. Gleason

John M. Gleason
Professor of Decision Sciences

2500 California Plaza Omaha, Nebraska 68178 (402) 280-2850 FAX: (402) 280-2172

Applied Information Management Institute

MULTIMEDIA ACCESS PROTOTYPE PROJECT

Creighton University Final Report

October 30, 1995

James T. Ault, III
John M. Gleason
Muthu Karuppan

This is the final report on the Creighton University efforts in support of the AIM-MAP project. Because of the nature of the project, this final report is essentially a compendium of the quarterly reports.

JANUARY - MARCH

The Creighton University group conducted marketing research to identify: (1) how information resources are used, (2) ease-of-use characteristics that would simplify accessing information, (3) interface preferences, and (4) types of information content of most interest.

Our research focused on perceptions of government decision makers in Washington, D. C., and perceptions of private citizens who live in the US West broadband test area in Omaha, Nebraska. The research was conducted in meetings with single individuals, small groups, and focus groups.

Government Decision Makers

Activities

Our research with government decision makers was conducted in meetings with single individuals and small groups. Senator Robert Kerrey has been a strong supporter of this project. We met with Senator Kerrey at the US West offices in Omaha in late December in order to develop an understanding of his vision of the project. From January 30-February 1 we met (in the order listed) with the following individuals in Washington D.C.:

Tim Schoeb, Systems Administrator, Senator Kerrey's office
Jon Christensen, U.S. Congressman
Paul Gresens, Legislative Assistant, Congressman Christensen's office
Pamela Davidson, Legislative Assistant, Congressman Christensen's office
David Gunning, Program Manager (AIM Project Director), Advanced Research Projects Agency, Department of Defense
Christopher Straub, Minority Staff Director, Senate Select Committee on Intelligence,
Carolyn Fuller, Consultant, Senator Kerrey's office
John Young, Majority Staff (Senator Thurmond's office), Senate Appropriations Committee
Eric Thoemmes, Majority Staff, Senate Armed Services Committee
Mary Sturtevant, Budget Director, Senate Intelligence Committee
Christopher McLean, Legal Counsel and Legislative Assistant, Senator Exon's office
Mike Kangior, Legislative Correspondent, Senator Exon's office
Pamela Johnson, Legislative Director, Congressman Bereuter's office
Robert Schramm, Jr., Project Coordinator (Geographic Imaging Network--Earth), National Geographic Society
John Etherton, Director of Procurement & Acquisitions, Senate Armed Services Committee (Sen. Thurmond)

John Douglas, Director for Foreign Policy, Senate Armed Services Committee (Senator Nunn)

Carlynn Thompson, Director (Directorate of Research, Development and Acquisition Information Support), Defense Technical Information Service, Department of Defense

Results

A preliminary analysis of information gathered during the meetings with government decision makers was presented to the AIM-MAP project participants at the February 3 bi-weekly meeting convened in the US West boardroom. A summary of that information:

Patterns of use of technology to gather information in the Senate and House offices. There is considerable reliance on the Congressional Research Service, political party research service (especially in the House), advocates and interest groups, Executive Branch sources, and Committee staff. Very few Senate or Congressional staffers engage in primary collection and reduction of data, although a few indicated interest if the resources were available. The primary information interest among House staff relates to the access and review of specific legislation, votes on specific legislation, and organized positions about specific legislation. Examples of information sources: CSPAN, wire services, LEGIS, Congressional Record, Congressional Quarterly, popular press, and Committee reports and recommendations.

Barriers to the use of technology. Barriers include Competing Services (for example, because of access to the Congressional Research Service, there is little perceived need for an on-line access to information), the Advocacy Setting (there is interest in finding information to support your position or to discredit your opponent's position), and Funding (there is no funding for such a system, since it would compete with the Congressional Research Service).

Personal awareness of technology. Few staffers have extensive experience with technology, and there is little awareness of how technology is being used in other organizations.

Design issues. Ease of use predominates, with a desire for an open-ended system that would accommodate increasing interest. User expectation sources included DTN-like interfaces, and MOSAIC/Netscape performance in a broadband environment.

Data applications and sources. Types of desired information included Political Constituent Analysis (census demographics, voting practices, and polling outcomes); Trade and Commerce Issues (exports/imports by source/destination, and data regarding facility location related to transportation, telecommunications, manufacturing, warehouse and distribution, and resources); and Public Emergency Response and Planning Information.

Private Citizens in the US West Broadband Test Area

Activities

We conducted focus group interviews with private citizens in the US West broadband test area in Omaha, Nebraska. Six focus groups (which included 59 individuals) were conducted February 24-26. The turnout for the focus groups was outstanding--the participation level was 104% of those who agreed to participate (all those who agreed to participate attended, and two other individuals simply showed up). The focus group composition:

Group 1: Homemakers and other adults with low tech backgrounds
Group 2: High school girls
Group 3: School teachers (elementary and secondary)
Group 4: High school boys
Group 5: Adults with high tech backgrounds
Group 6: Adults with high tech backgrounds

The groups included 10 male and 7 female high school students, and 24 male and 18 female adult participants.

We demonstrated four products as a basis for the focus group discussions: Van Sant's *Geosphere Project* (videotape summary), DeLorme Mapping's *Global Explorer* (a Windows-based CD-ROM), National Geographic's *World Atlas* (DOS-based multimedia CD-ROM), and DTN's subscription service.

Results

A preliminary analysis of information gathered from the focus groups was presented to the AIM-MAP project participants at the March 1 bi-weekly meeting convened in the US West boardroom. A summary of that information:

Characteristics of the participants. Household size was 3.4 persons. The mean family income of the adult participants was $62,660 (in an area where census data indicates a mean family income of $52,000, based on the midpoint of census bureau income intervals). The employed adult participants (that is, the non-homemakers) held high-status employment, including 19 professional/technical, 3 managerial, and 11 educational positions.

Uses of Information Technology. There is a high commitment to computing technology--76 computers in 58 reporting households (51 MS-DOS/Windows, 25 Apples [primarily teachers], 72% have modems, 31% use on-line services and/or Internet, 49% have CD players, 54% have sound). Respondents indicated 9.8 hours per week average computer usage at home. There was also a high commitment to television (2.99 televisions per household, 85% cable television). Favorite channels are Discovery, ESPN, The Learning Channel, Disney, and CNN.

Interface advantages/disadvantages.

Advantages of computer-type interfaces: active control, flexibility, multimedia availability, compatibility with existing tools.

Advantages of DTN-type interfaces: ease of use, current information, control over type and detail of information.

Disadvantages of computer-type interfaces: icons often ambiguous or obscure (DeLorme), too many icons (DeLorme), icons not intuitively obvious (DeLorme), poorly designed product (DeLorme), static information and associated cost of upgrades, navigation techniques unclear (DeLorme), coverage too shallow.

Disadvantages of DTN-type interfaces: boring, proprietary equipment incompatible with other systems, acceptable for beginners but too limiting for most, similar to newspaper or television.

Suggested improvements for set-top box. Develop a remote control device, develop icon-based access with drop-down identifiers, develop hierarchical menu, develop full-scale multimedia, develop an "artificial intelligence-type" user customization feature, develop compatibility with computers.

Interface preferences, ASSUMING the set-top box included the suggested improvements. Overwhelming support in all six groups for computer-based systems with well- designed exploding icons and multimedia presentations. As a compromise, several participants suggested an in-home adapter that would provide access to either system.

Information preferences.

Travel and Vacation Planning (interactive, social and cultural patterns, currency exchange issues, trip-tik maps and itineraries, seasonal climates, short-term weather forecasts, transportation schedules and reservations)

Local and Regional Services (interactive banking, shopping, and purchasing; telephone directories on-line; location and availability of products and services; on-demand advertising; news summaries similar to DTN; local and remote weather forecasts; location of hospitals, physicians, dentists, and clinics; nutrition and menu-planning linked to availability of items).

Political and governmental services (official's voting records, candidate's history and views, current debates, simulations [e.g. *Crossroads*], election results, pending legislation [text and schedules], court decisions [especially U.S. Supreme Court], reports on expenditures of tax dollars, Congressional Record).

Museums and Libraries (all of Smithsonian, museum collections, Library of Congress).

National Park Service (multimedia previews, interactive planning and reservations

APRIL - JUNE

The Creighton University group was involved in three activities:

1. We submitted written material to SAIC for use in the development of the Concept of Operations (CONOPS) integration plan.

2. We developed a project-related paper and submitted it for consideration for publication in a research journal.

3. At the AIM-MAP meeting on April 27, we presented an "overlay" report that examined similarities that our market research identified between information interests of focus group participants and federal government decision-makers

1. The CONOPS

At the request of SAIC, we reviewed the draft of the CONOPS and made revisions related to the market research aspects of the integration plan. We also provided a copy of our previous quarterly report to SAIC, and they used and cited the report in the development of the final version of the CONOPS.

2. Submission of a Project-Related Paper for Publication

As part of our academic research interests, we prepared and submitted a paper for consideration for publication in a journal which focuses on technology & engineering management. The title and abstract of the paper:

The Transfer and Commercialization of Information Technology: Technological Incrementalism vs. Escalating Consumer Expectations

Abstract

This paper discusses a technology transfer and commercialization project currently being conducted by a consortium of eight business and university organizations in collaboration with a federal agency and the R&D group of a telecommunications organization. The purpose of the project is to create a user-friendly, multimedia-based prototype system that will provide timely and accurate information from government geographic information databases to government decision makers and the general public in an easy-to-use interactive visual format. The general public (that is, private citizens, schools, and businesses) will be able to access the product via broadband-to-the-home technology. The organizational structure developed to achieve the project objectives, subject to significant time and funding constraints, is

examined. The main focus of the paper is the results of the product pre-design marketing research, and the implications related to consumer expectations regarding emerging technologies. Our research suggests that consumer expectations in the portion of the market upon which the success of the emerging technologies depend are inconsistent with the types of technologies that are being developed for that market.

3. The "Overlay" Report

The overlay report presented at the AIM-MAP meeting on April 27 examined similarities that our market research identified between information interests of focus group participants and federal government decision-makers. These similarities may be best viewed from a two-dimensional perspective (formal vs. informal and government vs. private).

From the formal vs. informal perspective, information interests of a formal nature includes information that is structured and available in the system ((for example, from sources such as the Congressional Research Service). At the informal end of the spectrum, unsubstantiated information (perhaps tanatamount to gossip) would be of interest.

From the government vs. private perspective, information interests of a government nature would include information to be obtained from government agencies, whereas information interests of a private nature would include information to be obtained from private interests (for example, business advertisements and airline schedules).

The appendix pages exhibit information interests identified on the basis of the market research conducted with the six focus groups in Omaha, and with federal government decision-makers in Washington D.C.. The interests are plotted in two-dimensional space for each of the six focus groups, for a composite of the six focus groups, for the federal government decision-makers, and for a composite of focus groups and government decision-makers.

For the focus groups, the circled numbers represent information interests specified by participants in the focus group indicated by the circled number The composition of the focus groups was discussed earlier in this report:

Group 1: Homemakers and other adults with low tech backgrounds
Group 2: High school girls
Group 3: School teachers (elementary and secondary)
Group 4: High school boys
Group 5: Adults with high tech backgrounds
Group 6: Adults with high tech backgrounds

For the government decision-makers, a circled C indicates Congressional staff, a circled S represents Senate staff, a circled F indicates senior Senate committee staff, a circled A or M represents high-level government administrators, and a triangulated C represents a specific Congressman. Details of the government interviewees may be found in the JANUARY-MARCH section of this report.

JULY - SEPTEMBER

In September, the Creighton University group arranged to conduct marketing research with focus groups composed of individuals who live in the US West broadband test area in Omaha, Nebraska. We organized focus groups composed of individuals who had participated in the product pre-design focus groups in February. The planned purpose of the September sessions was to obtain information regarding participant reaction to the television- and computer-based products which had been developed during the AIM-MAP project.

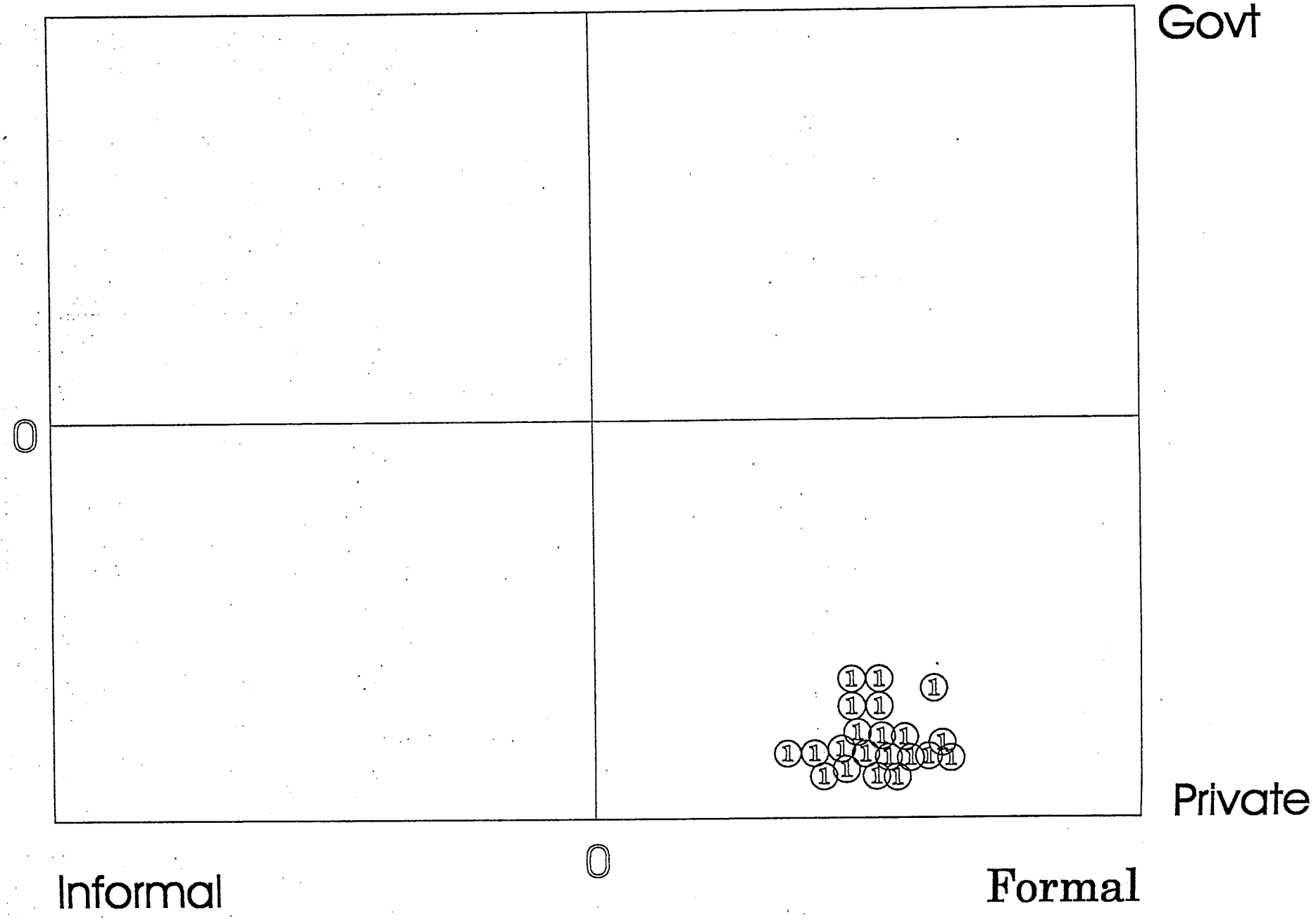
Numerous sessions were scheduled at the Science Applications International Corporation facility for the weekend of September 8, 9, and 10. Reminder/ confirmation letters, with directions to SAIC, were mailed on Tuesday, September 5.

On the night of September 5, we received a request from Doug Perry to cancel the focus groups, or to postpone them until modifications could be made to resolve hardware problems that had occurred the previous week during the ARPA symposium in Washington, D.C. We immediately contacted all participants and postponed the sessions until further notice.

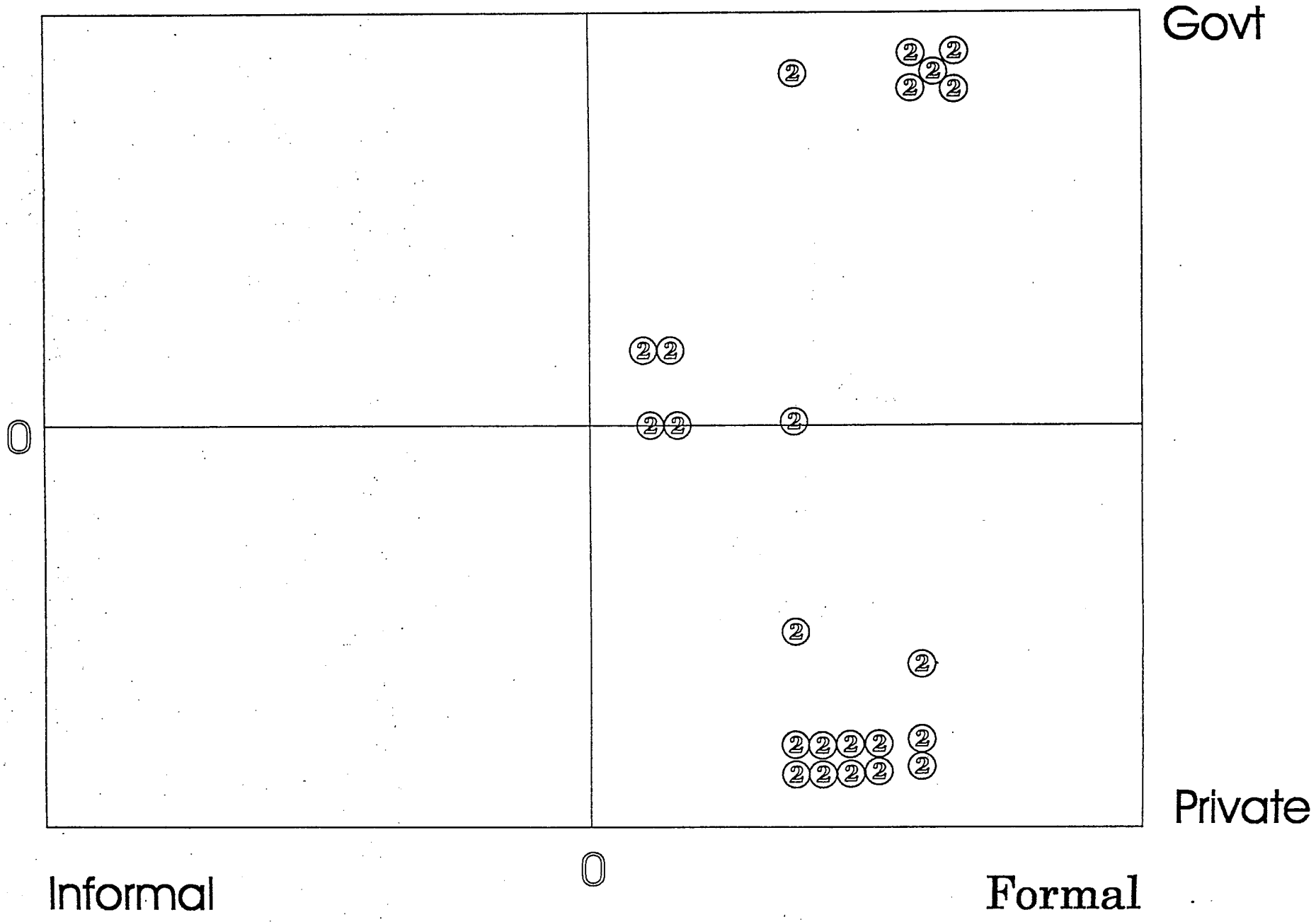
ARPA granted an extension (until the end of November) for the AIM-MAP project. However, at the time of the due date for this report, we have not been asked to reschedule the focus groups. Accordingly, we plan to contact the focus group participants to inform them that the sessions have been cancelled, and to express our appreciation for their involvement.

APPENDIX

Focus Group I



Focus Group 2



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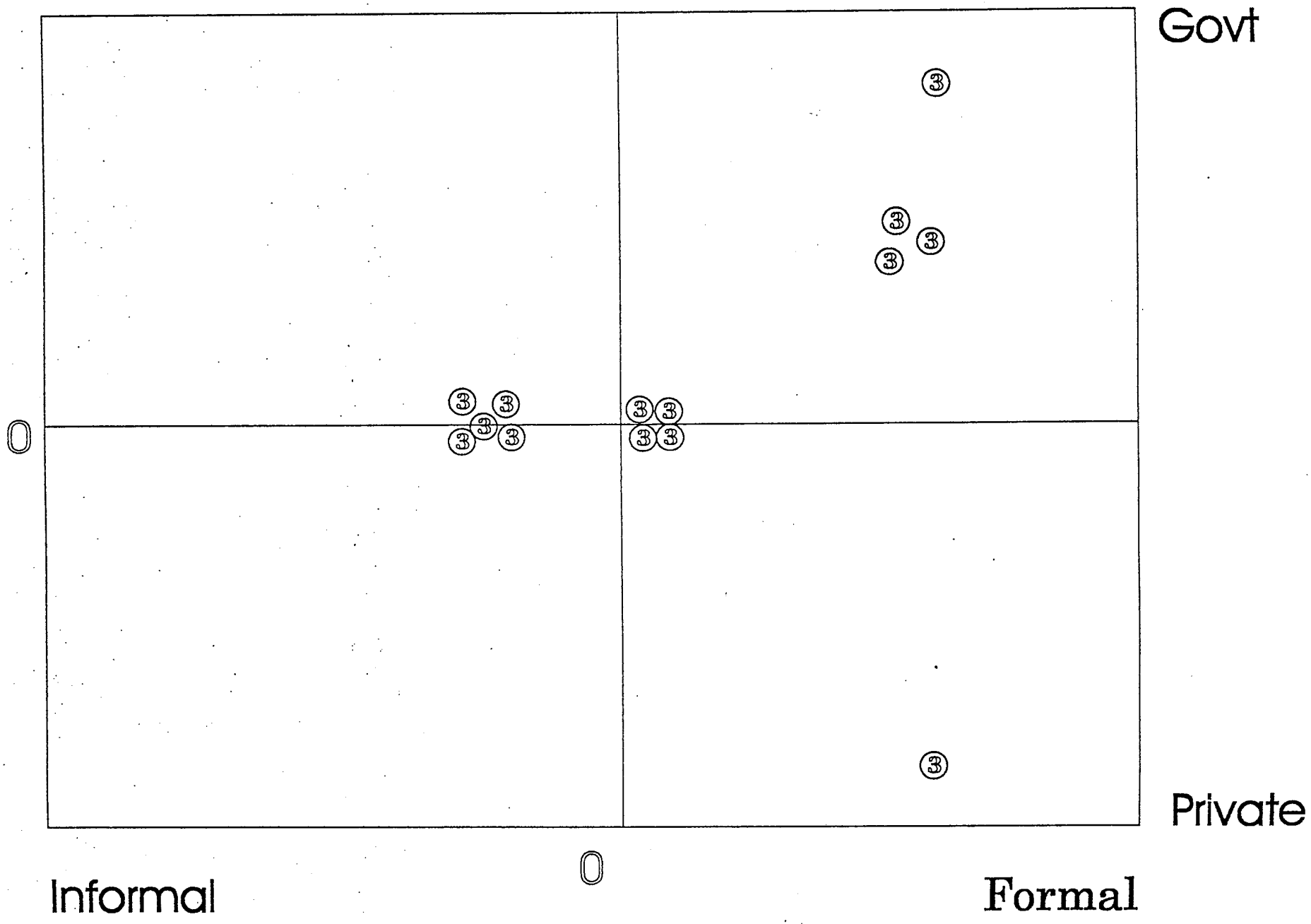
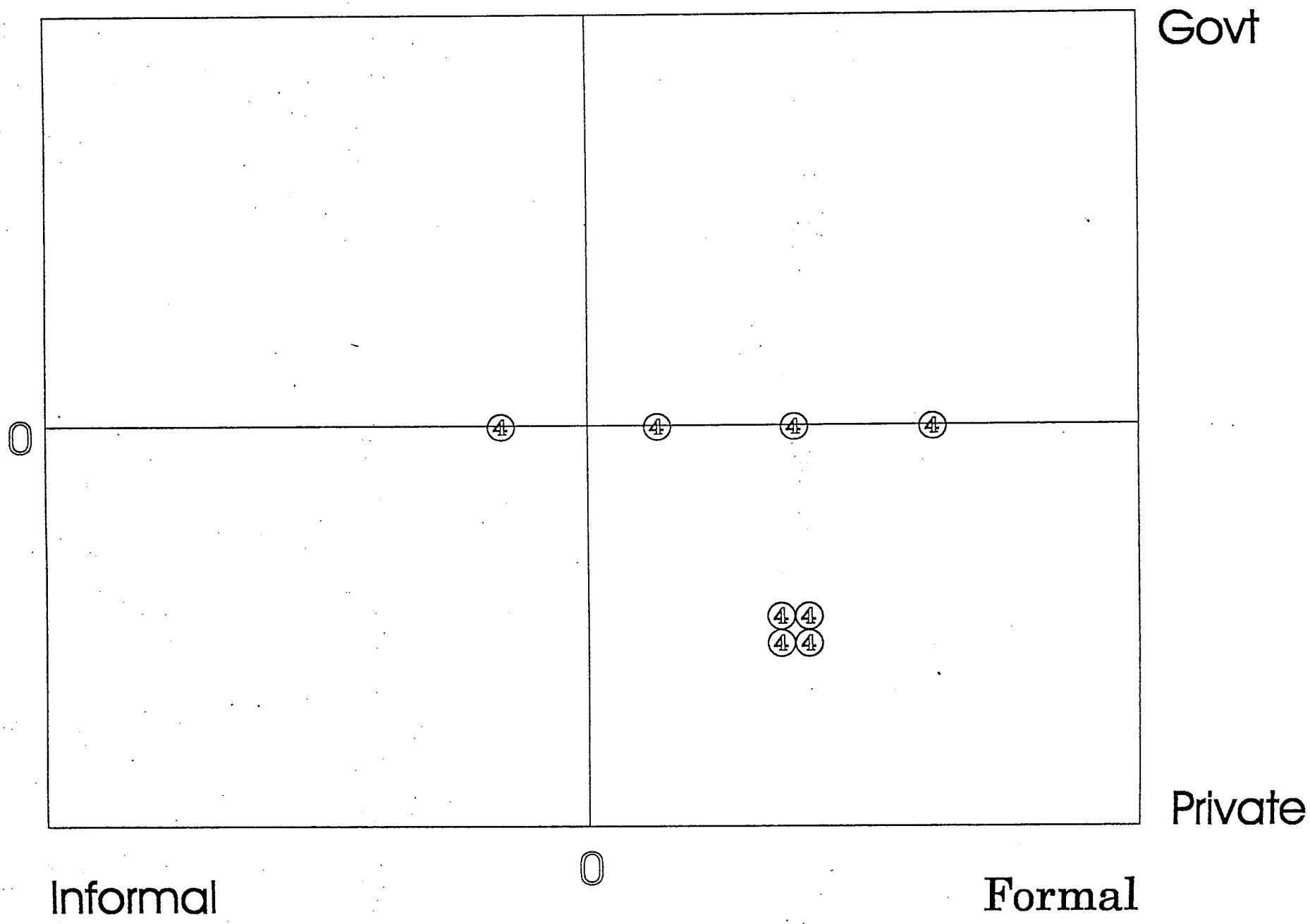
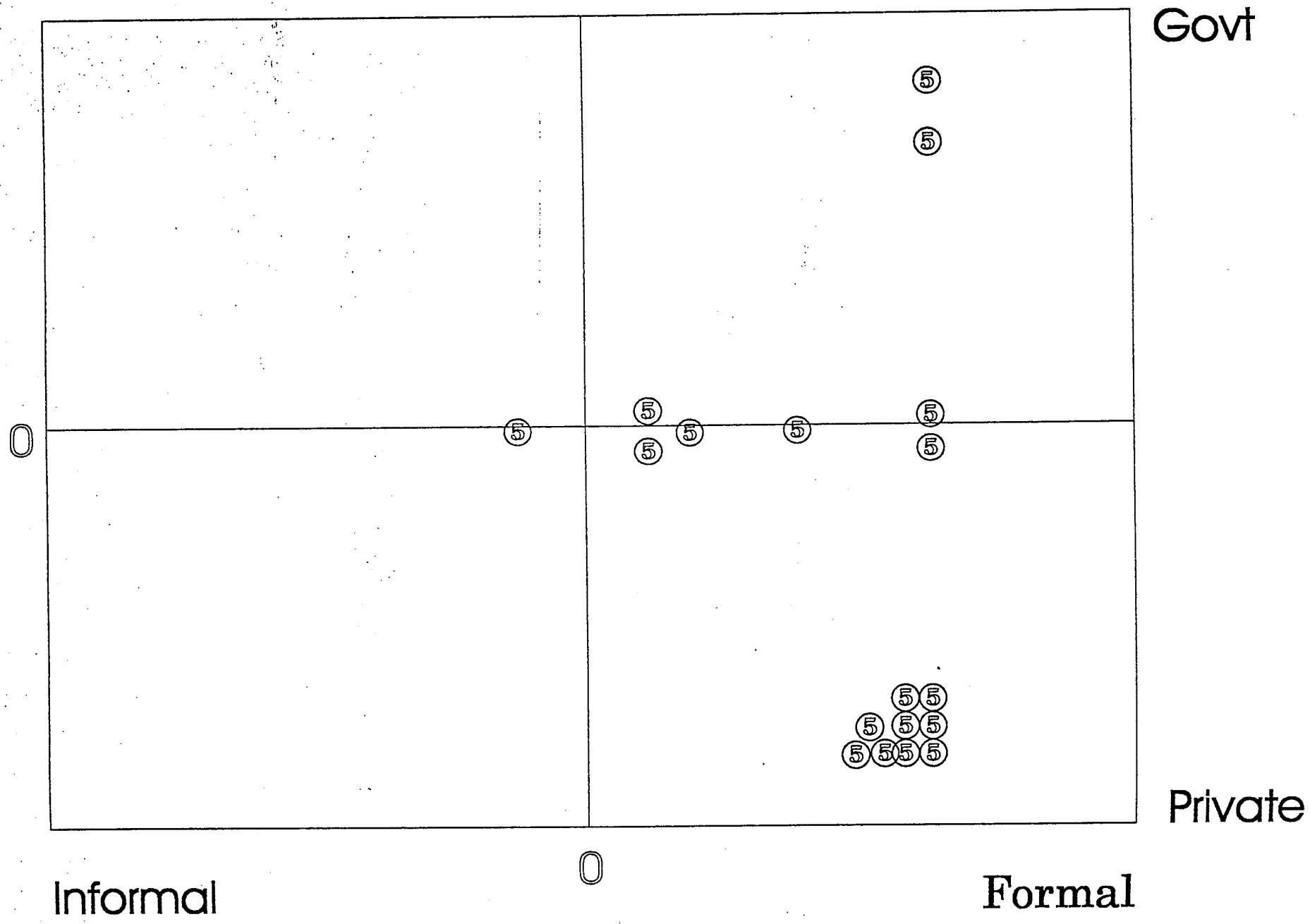


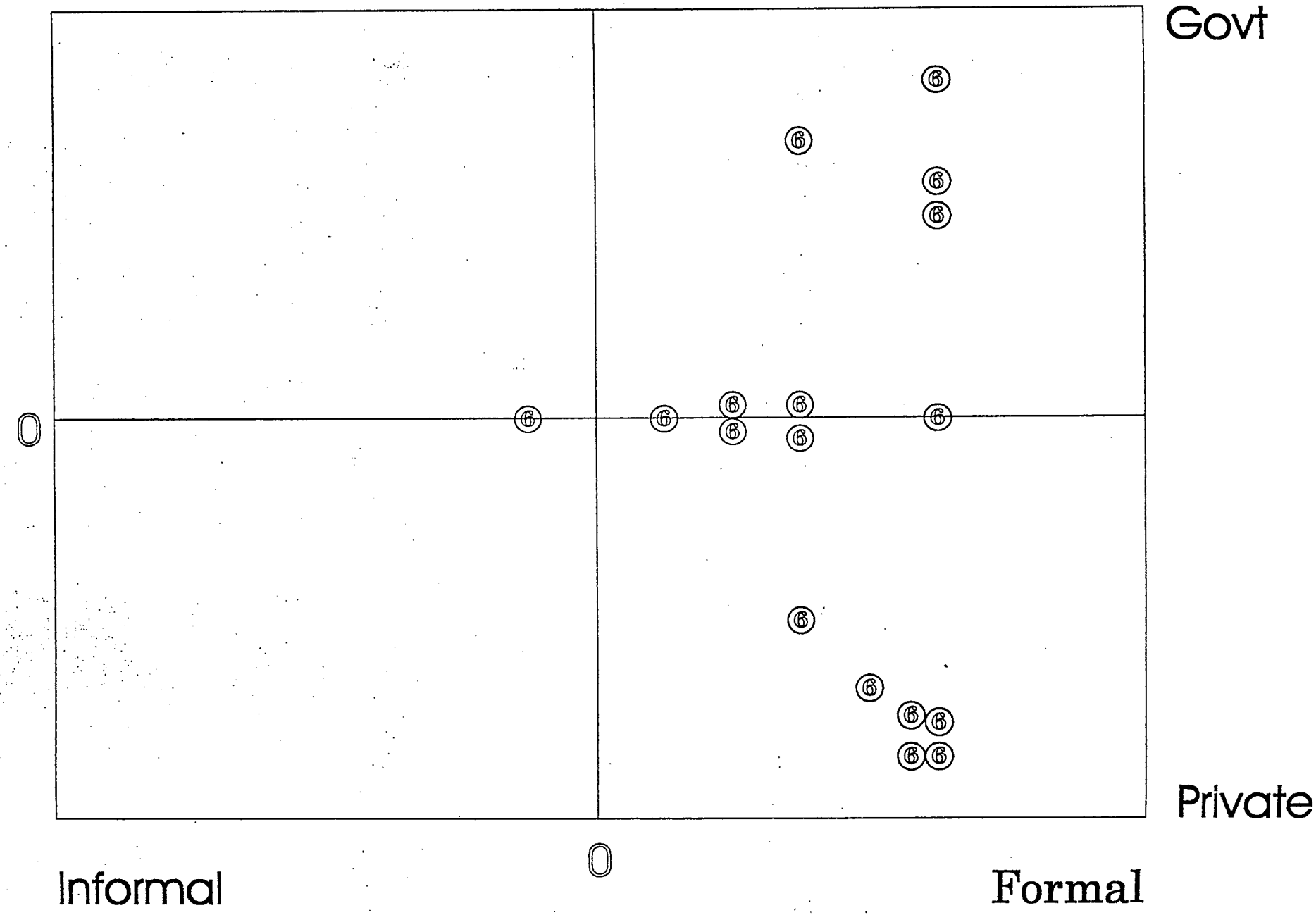
Focus Group 4



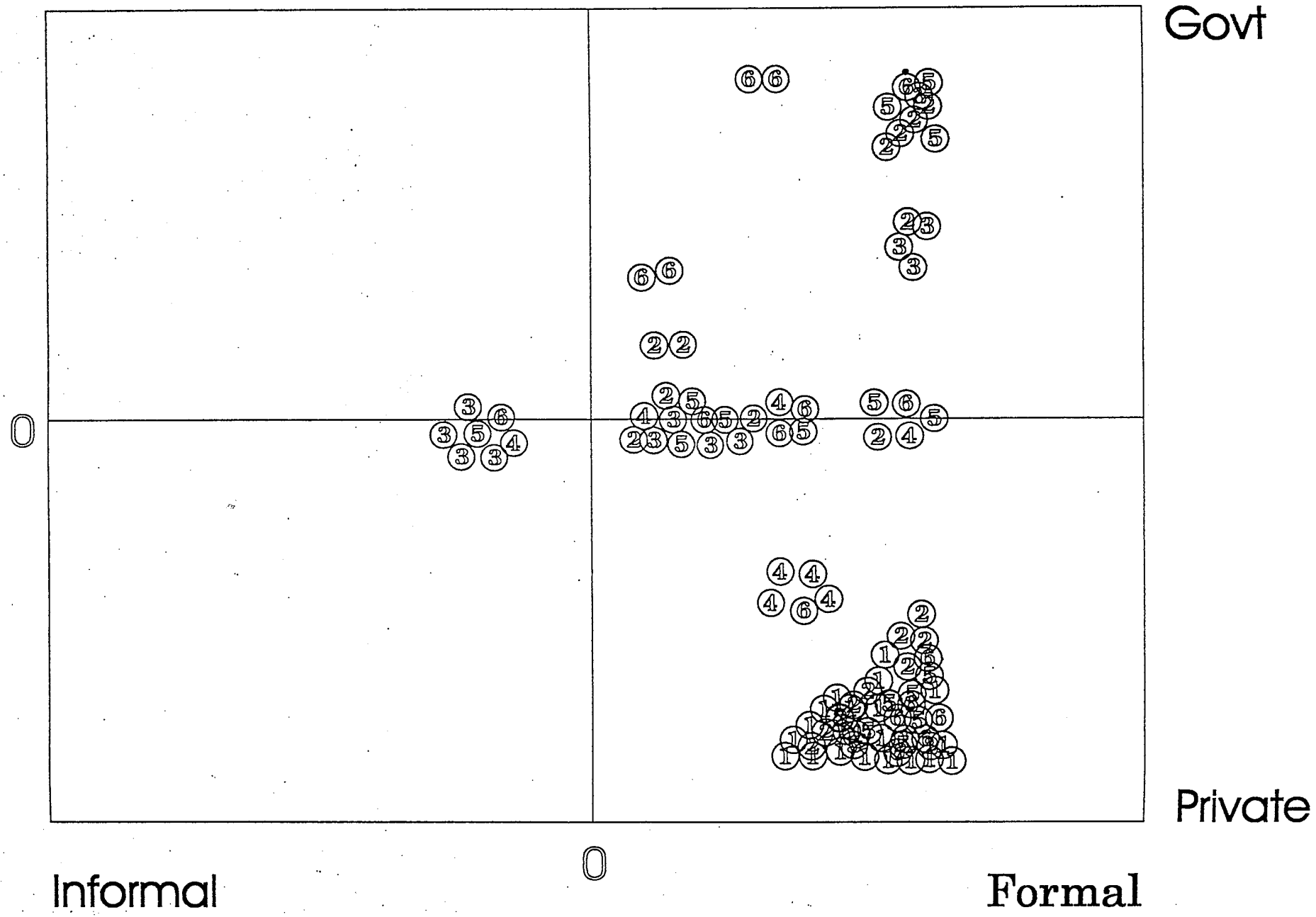
Focus Group 5



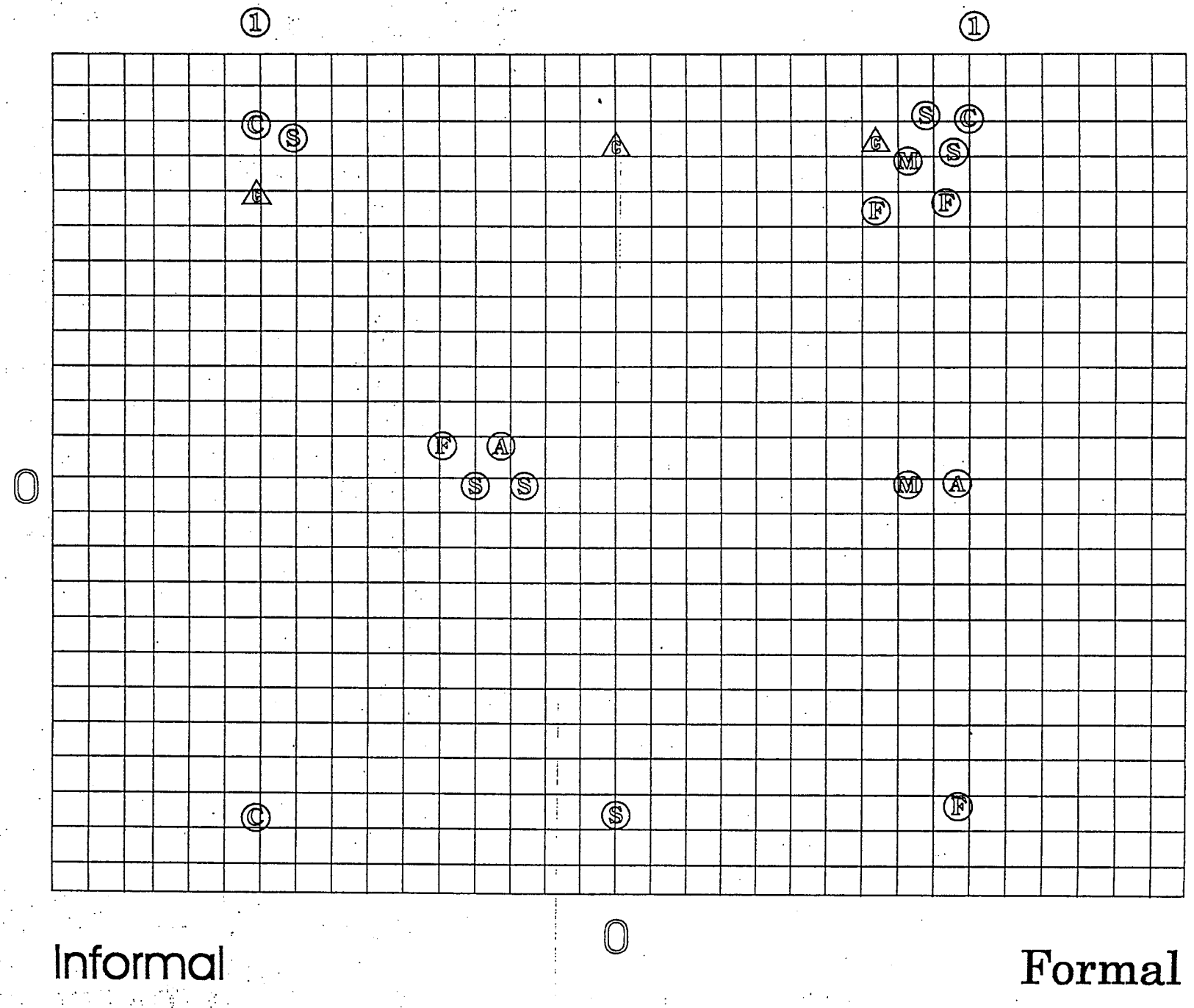
Focus Group 6



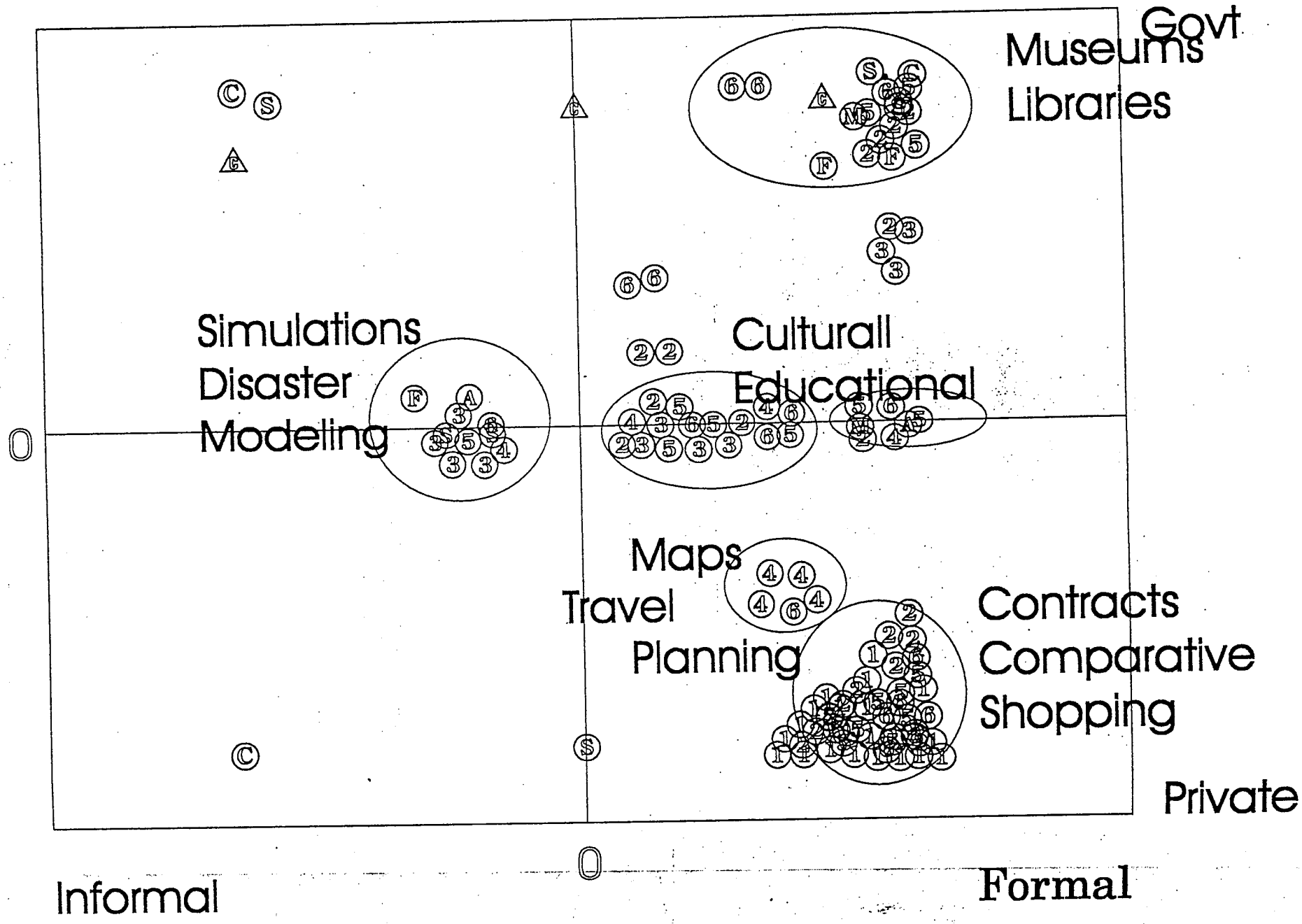
Focus Group Composite



Federal Gover :ment Interviews



Focus Group Composite
Federal Government Interviews



STUDIO 23
CREATIVE MULTIMEDIA
DESIGN & PRODUCTION

3035 SOUTH 72ND STREET
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OMAHA NE 68124

AIM MAP Final Report
12.13.95

Studio 23 is very pleased to have been a part of the Applied Information Management Institute's (AIM) Multimedia Access Prototype (MAP) Project. The experience, knowledge, and contacts made within the context of the MAP project have been critical to the growth and success of the studio.

The purpose of this document is to outline the challenges, decisions, and process Studio 23 went through to adapt to an increasingly critical role as the project progressed. Studio 23 transitioned from a role of contributing the visual navigation and communication system components, to handling the actual programming of the client functions within the final PC version of the prototype.

In order to communicate the process of developing the MAP, first the tasks must be stated, second, the approaches to completing those tasks must be stated, and third, the unpredicted tasks that developed during the course of the project must be explained.

The initial challenges faced by the Multimedia Presentation Technologies portion of the team were to:

1. Research existing multimedia technologies
2. Research existing GIS technologies
3. Develop information categorization structures
4. Develop navigational concept
5. Create visual systems to support the categorization & navigation structures
6. Help apply those visual systems to the Interactive Television (ITV) version of the MAP
7. Help apply those visual systems to the PC version of the MAP
   (This portion necessitated revising the Studio 23 contract to include full programming responsibilities for the PC client software.)
   a. Development of several "Pre-Alpha" concept demonstrations
   b. Selection of Development Platform
   c. Extensive development & testing of MAP

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1. Research existing multimedia technologies

The primary off-the-shelf multimedia software packages were examined based on their ability to:

- allow custom interface design
- ability to integrate with external custom code
- learning curve - relative to the project deadline
- cost of acquisition
- availability of cross-platform development tools
- licensing procedures
- and their ability to handle multiple data types.

The top software package based on the above criteria was MacroMedia's Authorware Professional.

2. Research existing GIS technologies

The primary off-the-shelf Geographic Information Systems software packages were examined based on their ability to:

- allow custom interface design
- ability to integrate with external custom code
- learning curve - relative to the project deadline
- cost of acquisition
- availability of cross-platform development tools
- licensing procedures
- and their ability to handle multiple data types.

The top software package based on the above criteria was Arcview (sp).

3. Develop information categorization structures

One of the most critical tasks that had to be accomplished was bringing the team into agreement on the system of categorizing information. The challenges of breaking down a world of information into navigable and hopefully prioritized navigation procedures were not small, in fact this challenge proved to be a very man-hour intensive undertaking and is perhaps on of the best component solutions to come from the MAP project.

The system created by the whole MAP team is a multi-dimensional array with the axis's labeled "Category," "Datatype," and "Geographic Level." Category and Geographic Level contain multiple and various sub categories, while Datatype contains only four divisions: Text, Photo/Image, Audio, and Video.

See Attachment XXXXX for a copy of the information categorization system.

4. Develop navigational concept

The navigational concept of the MAP is fairly simple. The user access available information on a topic relative to the information's geography, then refines that selection through use of the categorization system. Once the information is retrieved, then the user can use other functions to work with that information such as print the information or save the information to the local hard drive.

5. Create visual systems to support the categorization and navigation structures

Studio 23 developed two initial icon based design systems to communicate the categories and functions of the prototype. One of these systems was selected as the design style that would apply to all icons developed. These icon systems were developed down to the minor category range and in some cases down to the sub category range. However, due to time and budgetary constraints in the final PC prototype many of these images went unused.

Studio 23 also developed several screen GUI systems. These were used in initial prototyping and revised based on user and team feedback. The final PC screen interface design is also respondent to technical recommendations as to the file size, speed, and stability of the prototype.

6. Help apply those visual systems to the Interactive Television (ITV) version of the MAP

Studio 23 participated in training on-site in Boulder, CO for the development tools used to create the first Interactive TV version of MAP. Many design considerations became apparent based on the technology used by US WEST. These design issues included color systems, size of image and type, and navigation conventions. These adjustments were made on-site in Boulder as possible.

7. Help apply those visual systems to the PC version of the MAP

At this stage in the project it became critical to take another look at the scope of Studio 23's involvement in the project because there was nobody on the MAP team expecting to do the actual programming of the PC version of the MAP. Studio 23 had gained more staff since the beginning of the project and part of that staff was programming based, so the Studio 23 contract was revised to include programming the initial client software for the PC version of the MAP.

The first step was to develop several concept of operation models that showed the visual system, GUI, and navigation concept to be used in development of the project. These initial models were developed using MacroMedia Director, which does not offer as much functionality as Authoware, but is a faster visual concept development tool.

The second step was to select a development platform for the MAP. Macromedia Authorware was selected over any GIS package because Authoware offered a much better custom interface opportunity, quicker navigation system development, cross platform development capabilities, a shorter learning curve for the Studio 23 programmer, and a greater ability to display multimedia data types such as video and audio. The only drawback to Authorware as compared to GIS systems is that we could not use vector image for the navigation so each map used in the prototype had to be created and any "hot spots" created and placed manually. This is more labor intensive from a graphics stand point, but the look and feel of the navigation system we were after was simply not available in any GIS package.

Once these starting points were decided upon development began in earnest on the PC version of the MAP. The visual graphics and some of the initial programming were developed along parallel development tracks, with the visual system finishing first. The visuals were imported into Authorware and the system programming and integration were started.

The first major challenge was achieving connectivity between the client and the server. This was attempted over the internet and would have been successful except for the national security measures that had to be enforced by the network administrators at SAIC, where the server was located. After repeated attempts

to establish connectivity over the internet failed due to security precautions, the client software development station was moved to SAIC and the Studio 23 personnel developing the prototype client software worked at the SAIC location to establish connectivity via an ethernet local area network.

The method of connectivity was directly linked with the software tools used in both the client and server applications. Distinct Corporation's TCP/IP and NFS software packages were used to transfer database quaries to and from the server using Sockets based calls.

Due to the schedule for demonstrating the first version of the prototype calling for a due date of just before the ARPA Symposium, connectivity was achieved and many of the features demonstrated, but the mission of the project was as yet unfulfilled by the end of the Symposium. This necessitated a no-cost extenuation to the project to allow further development time to achieve the goals of stabilizing the program, revising the visual system, reducing the size of the executable program, developing further features & functions, removing "debugging" message windows, and general fine tuning of the program.

The approach to stabilizing the program included reducing the file size, attempting to use RPC programming instead of Sockets, and confirming matching paths. What we did not realize until we were well into this final phase was that one or two improvements in the way the visual system was handled greatly reduced the size of the executable file and added a much greater stability to the project.

The decision to use RPC programming rather than Sockets for the database calls went very well on SAIC's side of the program, but Studio 23's programmer was not able to successfully achieve connectivity to the server using the RPC programming. This drove a decision to move back to Sockets programming, which was known to work. Within a couple days connectivity was again achieved and testing began on the new prototype.

The final prototype connectivity required some additional Sockets programming to eliminate some infinite loop problems and timing problems within the program. These bugs were fixed with the addition of one more Sockets set.

With connectivity achieved and the program fairly stable, Studio 23's programmer started working on the print and download features of the prototype. The decision was made to use existing standard Windows programs to control some of these features. The programs used are Microsoft Notepad, and Microsoft Imagery. These programs work in conjunction with the MAP to give the user the ability to adjust and/or modify the files retrieved from the database before saving to the local hard drive or printing to the local printer.

At the time of this writing the only problem with the prototype is believed to be based on a low RAM in the client station – after using the program for around 13 database quaries the program runs out of memory and crashes.

In general the MAP has achieved it's goals to be a geographic based information source that users navigate visually to access static and real-time database information. The information is all publicly available and most of the information has been downloaded off the Internet from publicly available World Wide Web sites.

The MAP project has demonstrated the differences between developing software for PC applications and using emerging technologies such as Interactive Television. The project has also shown that many off-the-shelf applications can be combined to achieve the goals of rapid prototyping for use as proof of concept applications.

In conclusion the following considerations must be taken into account in any further development of the system.

1. Potential to incorporate live GIS navigation techniques.

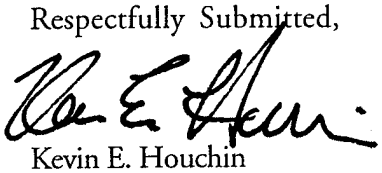
The first place Studio 23 would recommend to spend any additional funding would be in the exploration/implementation of a vector image layer of programming within the system. This may cause the elimination of the Authorware package and force a dependence upon totally writing the program in custom code. While using vector images will greatly change the aesthetic quality of the program, it could potentially open up a vast amount of data resources that would be useful to public policy decision making, such as highway construction, flood data, etc.

2. Potential to develop as a private commercial software package for a company with a large need for technical support for users who need a more friendly interface.

3. Potential to develop into a premier information based Internet world wide web site.

4. Potential to develop into a niche market on-line service.

Respectfully Submitted,



Kevin E. Houchin

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September 30, 1995

Mr. Douglas J. Perry
Applied Information Management Institute
1314 Douglas On-the-Mall
Omaha, NE 68102

Dear Doug:

We at CALMIT have thoroughly enjoyed being part of the MAP project team. Attached is a brief summary of our accomplishments for use in the final report. I am not certain what level of detail you intend to provide in the final project documentation, so please don't hesitate to contact me if you have any questions about the enclosure or wish to have additional information (e.g., lists of files, sample file output).

I hope that the MAP project will continue on in some form, and that we will have a chance to work with you in the future. Best wishes!

Sincerely,

James W. Merchant
Associate Professor and Associate Director

August 30, 1995

Contribution for AIM Final Report

Center for Advanced Land Management Information Technologies (CALMIT)
University of Nebraska-Lincoln

Project staff:

Dr. James W. Merchant
Mr. Larry K. Zink
Mr. Asad Ullah
Mr. Michael Kelley

During the first phase of the MAP Project CALMIT efforts were principally directed towards the following activities: identifying candidate GIS software (ArcView) and GIS data (e.g., Digital Chart of the World); establishing contacts with individuals, agencies and organizations involved in complementary activities; identifying, downloading and archiving textual and image data using the World Wide Web; and developing scenarios for the prototype MAP product. Some of our specific activities included the following:

1. Provided the MAP team with a variety of background reading on GIS technology, and applications of multimedia and visualization in GIS;

2. In conjunction with SAIC, demonstrated ArcView software for the MAP team;

3. Briefed the Nebraska GIS Steering Committee on the MAP Project; published article on the MAP Project in the Nebraska GIS Steering Committee's newsletter, **Nebraska GIS Update**;

4. Aided in identification of participants for focus groups (e.g., Julie Dial, Nebraska Earth Science Education Network Coordinator);

5. Informed Nebraska legislators and legislative staff from Omaha area about the AIM project via Val Goodman (Legislative Research Office);

6. Obtained information from the National Archives and Records Service (NARS) on a recent project focussed on delivery of NARS data to Nebraskans via the Internet and other electronic means;

7. Provided MAP team information on a project in Johnston County, NC that has several parallels with the MAP project;

8. Contacted the following agencies to request/obtain access to data:
   City of Omaha Public Works Department
   Omaha Public Power District
   U.S. National Park Service Midwest Center
   SPOT Image Corporation
   USGS/EROS Data Center

9. Compiled and distributed to the MAP team a list of several dozen WWW sites having remote sensing and GIS data holdings;

10. Developed several ideas for modifying scenarios initially proposed by Doug McMains:
    Niobrara River Scenario 1 - tourism and recreation; planning a family vacation
    Niobrara River Scenario 2 - public policy decisions relating to a proposed Niobrara River National Park
    Niobrara River Scenario 3 - student project on environmental issues in the Niobrara River watershed
    Australia Scenario 1 - planning a trip to Australia
    Australia Scenario 2 - economic, trade and commerce information
    International Scenario 3 - a world crisis scenario

11. Provided textual data and imagery (GIF files) of Australia for use in Studio 23 preliminary design studies;

12. Initiated development of multifaceted databases for Belize, Mexico, Japan, China, Hong Kong, Taiwan, Thailand, Vietnam, Iraq, Kuwait, Australia.

During the second phase of the MAP Project, as MAP emphases changed somewhat, CALMIT efforts shifted towards the following activities: identifying, downloading and archiving textual and image data using the World Wide Web; preparing data required for MAP demonstration projects; reformatting and developing digital databases for Nebraska utilizing ARC/INFO files resident at UNL; and establishing FTP accounts for SAIC and Studio 23 on the CALMIT computer network so that they could download data directly. Some of our specific activities included:

1. Delivered test files (text, maps and graphics) to Studio 23 to obtain feedback on the acceptability of the file formats and graphic appearance;

2. Identified and downloaded data (text, graphics, photos) for use in MAP television and PC demonstrations. CALMIT's focus was on Australia, South Africa, Belize and Venezuela and their respective provinces, states and cities.

3. Reformatted data (converted HTML to ASCII, converted GIF files to TIFF format, broke up large files into smaller topic-specific files) and used Microsoft Access software to create metadata following the SAIC protocol; metadata files were updated each week and forwarded (FTP) to SAIC.

4. Acquired and reformatted (to TIFF files) several dozen ARC/INFO files of Nebraska (e.g, roads, land use, rivers, topography, soils) and tested ways to simplify these datasets for use in the MAP project;

5. Provided approximately 550 files for use in final MAP PC demonstration.

VIEW	DIVISION	MAJCAT	MINORCAT	SUBCAT	FILENAME	AIMCAL,LOCAL AD	ADDRESS	COMMENTS
REGION	VICTORIA	GEOGRAPHY	ENVIRONMENT		envir&geog.txt	/n/burn3/australia	http://www.vicnet.au/vicnet/VICTOUR/GEOG.HT	an outline of Victoria's environment and
LOCAL	MELBOURNE	SERVICES	ATTRACTIONS		out_and_about.txt	/n/burn3/australia	http://www.vicnet.au/vicnet/WOTSON/june/out.	general tourist information on what to see in
REGION	VICTORIA	SERVICES	ATTRACTIONS	DINING	melbding.gif	/n/burn3/australia	http://www.csu.edu.au/education/australia.html	open air dinining in Melborne, Victoria, Australia
LOCAL	MELBOURNE	GEOGRAPHY	CLIMATE		temp&precip.txt	/n/burn3/australia	gopher://babel.ho.BOM.GOV.AU:70/00/Australia%20	temperature and precipitation data on
LOCAL	MELBOURNE	GEOGRAPHY	ENVIRONMENT		melbourne_envir.txt	/n/burn3/australia	http://www.vicnet.au/vicnet/VICTOUR/GEOG.HT	general description of Melbourne
LOCAL	MELBOURNE	GEOGRAPHY			melbourne.tif	/n/burn3/australia	http://www.monash.edu.au/melbourne/melbourne	photo of Melbourne city skyline from the
NATION	AUSTRALIA	ECONOMY	PROFILE	CURRENCY	exchange_rate.txt	/n/burn3/australia	http://www.dna.lth.se/cgi-bin/rates?AUD+A	Australian currency exchange rates
REGION	VICTORIA	SERVICES	TRAVEL	TRAVEL INFORMATION	vic_happenings.txt	/n/burn3/australia	http://www.vicnet.au/vicnet/VICTOUR/VTAPR.HT	general tourist information about events in
LOCAL	MELBOURNE	ECONOMY	COMMERCE&TRADE	RETAIL TRADE	business.txt	/n/burn3/australia	http://www.vicnet.au/vicnet/vicgov/invest/melb	about establishing a business in
REGION	VICTORIA	GEOGRAPHY	MAPS		map_of_victoria.tif	/n/burn3/australia	http://www.csu.edu.au/cgi-bin/imagemap/a	map of Victoria, Australia
REGION	VICTORIA	GEOGRAPHY	ATTRIBUTES	LOCATION	vic_location.tif	/n/burn3/australia	http://155.187.10.12:80/images/maps/aust-vic.gif	location of Victoria on Australia map
NATION	AUSTRALIA	PEOPLE	DEMOGRAPHICS	POPULATION DISTRIBUTION	states_pop.txt	/n/burn3/australia	http://155.187.10.12:80/oz/faq-geography.html	Australian population by state/territory
NATION	AUSTRALIA	GOVERNMENT	CHARACTERISTICS	FLAG	aus_states_flag.txt	/n/burn3/australia	http://155.187.10.12:80/oz/flag-state.html	information about the flags of each of the
NATION	AUSTRALIA	ECONOMY	COMMERCE&TRADE	EXPORTS	expopie.tif	/n/burn3/australia		pie chart of Australian export partners

VIEW	DIVISION	MAJCAT	MINORCAT	SUBCAT	FILENAME	AIMCAL.LOCAL AD	ADDRESS	COMMENTS
NATION	AUSTRALIA	GEOGRAPHY	ATTRIBUTES	LOCATION	geodata.txt	/n/burn3/australi a		documant that has numerous tables of data
NATION	AUSTRALIA	ECONOMY	COMMERCE&TRA DE		trade.txt	/n/burn3/australi a	http://gil.ipswichc ity.qld.gov.au/oz0 57.html	general information about Autralilia
REGION	VICTORIA	SERVICES	TRAVEL	TRAVEL INFORMATION	Railway_timetabl e.txt	/n/burn3/australi a	http://www.mon ash.edu.au/ccsta ff2/che/bromage	Melbourne to Sydney rail schedule
REGION	NORTHERN TERRITORY	SERVICES	TRAVEL	TRAVEL INFORMATION	centre_b.gif	/n/burn3/australi a	http://www.world .net/Travel/Austra lia/NT_info/NTTC	map of central Australia to go with the tourist
NATION	AUSTRALIA	GOVERNMENT			All_Australian_Pos tcodes.txt	/n/burn3/australi a	http://www.csu.e du.au/education /australia.html	postal codes for Australian cities
NATION	AUSTRALIA	SERVICES	ATTRACTIONS	ARTS	sydopera.gif	/n/burn3/australi a	http://www.csu.e du.au/australia/g allery	photo of the Sydney Opera House in the
NATION	AUSTRALIA	GOVERNMENT	CHARACTERISTICS	CAPITAL	CANBERRA.GIF	/n/burn3/australi a	http://www.csu.e du.au/australia/g allery	an aerial view of Canberra, Australia
NATION	AUSTRALIA	GEOGRAPHY	MAPS		Austmap.gif	/n/burn3/australi a	http://www.csu.e du.au/education /australia.html	a good sharp gif map of the outline of
NATION	AUSTRALIA				AustReg.txt	/n/burn3/australi a	http://155.187.10. 12/world/australi a-region.html	general information about the
LOCAL	MELBOURNE	NEWS	WEATHER	TODAY'S FORECAST	curr_forecast.txt	/n/burn3/australi a	gopher://babel.h o.BOM.GOV.AU/0 0/Australia%20We	current weather forecast for Melbourne
REGION	NORTHERN TERRITORY	SERVICES	ATTRACTIONS	SCENIC ATTRACTIONS	DevMarbl.gif	/n/burn3/australi a	http://www.world .net/Travel/austra lia/NT_info/NTTC/	a photo of Devil's Marbles
NATION	AUSTRALIA	GEOGRAPHY	ENVIRONMENT		region.txt	/n/burn3/australi a	gopher://kaos.eri n.gov.au//0/envir onments/regional	provides text background on regional
REGION	NORTHERN TERRITORY	SERVICES	TRAVEL	TRAVEL INFORMATION	topend_b.gif	/n/burn3/australi a	http://www.world .net/Travel/Austra lia/NT_info/NTTC	map of the north end of the north central region of
REGION	NORTHERN TERRITORY	SERVICES	TRAVEL	TRAVEL INFORMATION	nt_b.gif	/n/burn3/australi a	http://www.world .net/Travel/Austra lia/NT_info/NTTC	map of the north central region of Australia

VIEW	DIVISION	MAJCAT	MINORCAT	SUBCAT	FILENAME	AIMCAL.LOCAL AD	ADDRESS	COMMENTS
REGION	NORTHERN TERRITORY	SERVICES	TRAVEL	TRAVEL INFORMATION	ntaust.gif	/n/burn3/australia	http://www.world.net/Travel/Australia/NT_info/NTTC	map of the whole of Australia with the
REGION	NORTHERN TERRITORY	SERVICES	TRAVEL	TRAVEL INFORMATION	nrthtour.txt	/n/burn3/australia	http://www.world.net/Travel/Australia/NT_info/NTTC	tourist information for the Northwest
NATION	AUSTRALIA	GEOGRAPHY	ENVIRONMENT		br_reg.txt	/n/burn3/australia		an overview of environmental regionalism
NATION	AUSTRALIA	GEOGRAPHY	ENVIRONMENT		region2.gif	/n/burn3/australia	http://kaos.erin.gov.au/land/regions/adel3.html#Ma	a map of Australia showing the different
NATION	AUSTRALIA	GEOGRAPHY	ENVIRONMENT		region2.txt	/n/burn3/australia	http://kaos.erin.gov.au/land/regions/adel3.html	appendix 1 at the end of this document
REGION	NORTHERN TERRITORY	SERVICES	ATTRACTIONS	SCENIC ATTRACTIONS	Olgas.gif	/n/burn3/australia	http://www.world.net/Travel/australia/NT_info/NTTC/	a photo of a rock formation in Northwest
NATION	AUSTRALIA	GOVERNMENT	CHARACTERISTICS	CAPITAL	aerialviewof_canberra.tif	/n/burn3/australia	http://www.auslig.gov.au/Canberra.gif	oblique aerial photo of Canberra
NATION	AUSTRALIA	GOVERNMENT	LEADERSHIP	STRUCTURE	aus_primeminister.tif	/n/burn3/australia	http://www.acru.uq.oz.au/~cjanz/a-	picture of Australian Prime Minister
NATION	AUSTRALIA	ECONOMY	COMMERCE&TRADE	IMPORTS	inpopie.tif	/n/burn3/australia		pie chart of Australian import partners
NATION	AUSTRALIA	GOVERNMENT	LEADERSHIP	ELECTIONS	electsys.txt	/n/burn3/australia	http://www.csu.edu.au/australia/defat/electsys.html	Australian electoral system
NATION	AUSTRALIA	GOVERNMENT	LAW	CONSTITUTION	auconstitution.txt	/n/burn3/australia	http://info.dpac.tas.gov.au/features/auconstitution.h	Australia constitution
NATION	AUSTRALIA	GOVERNMENT	CHARACTERISTICS	FLAG	flag_of_aus.tif	/n/burn3/australia	http://www.csu.au/australia/flag.gif	Australian national flag
NATION	AUSTRALIA	ECONOMY	PROFILE	CURRENCY	currency.txt	/n/burn3/australia	http://www.csu.edu.au/australia/defat/currency.ht	Australian currency fact sheet
NATION	AUSTRALIA	GOVERNMENT	CHARACTERISTICS	FLAG	aus_cap_terri_flag.tif	/n/burn3/australia	http://acslink.net.au/~tomw/act.flag.html	Australian Capital Territory flag

VIEW	DIVISION	MAJCAT	MINORCAT	SUBCAT	FILENAME	AIMCAL.LOCAL AD	ADDRESS	COMMENTS
NATION	AUSTRALIA	GOVERNMENT	LEADERSHIP	STRUCTURE	govsys_currentgov.txt	/n/burn3/australia	http://155.187.10.12:80/02/faq-politics.html	current system of government - elected officials
LOCAL	CANBERRA	NEWS	WEATHER	TODAY'S FORECAST	curr_weather.txt	/n/burn3/australia	gopher://babel.ho.BOM.GOV.AU:70/00/Australian:20	6/1/95 forecast for Canberra
NATION	AUSTRALIA	NEWS	WEATHER	WEATHER MAP	weather_img6_1_95.tif	/n/burn3/australia	gopher://life.anu.edu.au/19/weather/ausvist.gif	6/1/95 satellite image
NATION	AUSTRALIA	GEOGRAPHY	MAPS		regional_map_aus.tif	/n/burn3/australia	http://155.187.10.12/images/maps/australia_region.g	map of Australia in a regional perspective
NATION	AUSTRALIA	GEOGRAPHY	MAPS		map_of_aus2.tif	/n/burn3/australia	http://155.187.10.12/images/maps/australia.gif	general map of Australia
NATION	AUSTRALIA	GEOGRAPHY	MAPS		map_of_Aus.tif	/n/burn3/australia	http://155.187.10.12/images/maps/australia.gif	general map of Australia
NATION	AUSTRALIA	GEOGRAPHY	MAPS		global_map_aus.tif	/n/burn3/australia	http://wings.buffalo.edu/world/vt2/	Map of Australia in a global perspective
NATION	AUSTRALIA				aus_facts.txt	/n/burn3/australia	http://ww.csu.edu.au/australia/ozdat.html	CIA Fact Book general description of
NATION	AUSTRALIA	GOVERNMENT	CHARACTERISTICS	FLAG	aus_flag.txt	/n/burn3/australia	http://155.187.10.12:80/oz/flag.html	background on various Australian national flags
NATION	AUSTRALIA	GEOGRAPHY	CLIMATE		climatedata_of_capitals.txt	/n/burn3/australia	gopher://babel.ho.BOM.GOV.AU:70/00/Australian:20	temperature and precipitation tables for all of
NATION	AUSTRALIA	ECONOMY	PROFILE		economic_profile.txt	/n/burn3/australia	http://gil.ipswichcity.qld.gov.au/oz045.html	description of economic activities and
NATION	AUSTRALIA	GEOGRAPHY	ENVIRONMENT	WILDLIFE	currawong.au	/n/burn3/australia	http://155.187.10.12:80/anbg.html	SUN audio file of the song of the Currawong bird
NATION	AUSTRALIA	GEOGRAPHY	ENVIRONMENT	WILDLIFE	currawong_bird.tif	/n/burn3/australia	http://155.187.10.12:80/anbf/birds.html	picture of Currawong (bird)
NATION	AUSTRALIA	GEOGRAPHY	ENVIRONMENT	VEGETATION	nat_vegetation.tif	/n/burn3/australia	http://kaos.erin.gov.au/land/vegetation/nat_veg_str	Australia natural vegetation map

VIEW	DIVISION	MAJCAT	MINORCAT	SUBCAT	FILENAME	AIMCAL.LOCAL AD	ADDRESS	COMMENTS
NATION	AUSTRALIA	GEOGRAPHY	ENVIRONMENT	VEGETATION	plantcover.tif	/n/burn3/australia	http://www.erin.gov.au/ndvi/plant_cover.html	plant cover map derived from satellite imagery
NATION	AUSTRALIA	GOVERNMENT	CHARACTERISTICS	TYPE/FORM	govsys.txt	/n/burn3/australia	http://www.csu.edu.au/australia/defat/govsys.html	Australian system of government -
LOCAL	CANBERRA	GEOGRAPHY	CLIMATE		clim_capitalcity.txt	/n/burn3/australia	gopher://babel.ho.BOM.GOV.AU:70/00/Australian:20	temperature and precipitation tables for
NATION	AUSTRALIA	GOVERNMENT	LEADERSHIP	STRUCTURE	parliament_bldg.tif	/n/burn3/australia	http://gil.iqswichcity.qld.gov.au/parl2.html	picture of parliament building
NATION	AUSTRALIA	GEOGRAPHY	ATTRIBUTES	MARITIME CLAIMS	maritime_bound_aus.tif	/n/burn3/australia	http://www.auslig.gov.au/maritime.gif	map of Australian maritime
NATION	AUSTRALIA	GEOGRAPHY	ATTRIBUTES	MARITIME CLAIMS	maritime_bound_aus.txt	/n/burn3/australia	http://www.auslig.gov.au/geopack/ambis.htm	description of Australian maritime
NATION	AUSTRALIA	GEOGRAPHY	ATTRIBUTES	LOCATION	cent_of-aus.txt	/n/burn3/australia	http://www.auslig.gov.au/gopher/bbs/ausgeod/ce	how to find the center of Australia
NATION	AUSTRALIA	GEOGRAPHY	ATTRIBUTES	FEATURES	uluru_rock.tif	/n/burn3/australia	http://www.auslig.gov.au/welcome.htm	picture of Uluru Rock
NATION	AUSTRALIA	GEOGRAPHY	ATTRIBUTES		aus_geodata.txt	/n/burn3/australia	http://www.ausl:g.gov.au/gopher/bbs/ausgeod/aus	general geographic data, national
NATION	AUSTRALIA	PEOPLE	DEMOGRAPHICS	POPULATION COMPOSITION	people.txt	/n/burn3/australia	http://gil.ipswichcity.qld.gov.au/oz11.html	about the people of Australia
NATION	AUSTRALIA	PEOPLE	DEMOGRAPHICS	POPULATION COMPOSITION	people.tif	/n/burn3/australia	http://gil.ipswichcity.qld.gov.au/people2.html	aboriginal people
NATION	AUSTRALIA	GEOGRAPHY	ENVIRONMENT	LANDUSE	landple.tif	/n/burn3/australia		pie chart of Australian Land Use
REGION	TASMANIA	GEOGRAPHY	ENVIRONMENT	WILDLIFE	salmon.gif	/n/burn3/australia	http://www.csu.edu.au/education/australia.html	Tasmania's Atlantic (?) salmon
REGION	VICTORIA	SERVICES	ATTRACTIONS	SCENIC ATTRACTIONS	apostles.gif	/n/burn3/australia	http://www.csu.edu.au/education/australia.html	Twelve Apostles, Victoria, Australia

VIEW	DIVISION	MAJCAT	MINORCAT	SUBCAT	FILENAME	AIMCAL.LOCAL AD	ADDRESS	COMMENTS
REGION	NEW SOUTH WALES	GOVERNMENT	CHARACTERISTICS	CA(ITAL	sydney.gif	/n/burn3/australia	http://www.csu.edu.au/australia/gallery	aerial view of Sydney harbor
NATION	AUSTRALIA	PEOPLE	LIFESTYLE	CULTURE	aborcave.gif	/n/burn3/australia	http://www.csu.edu.au/education/australia/gallery/	aboriginalcave painting
NATION	AUSTRALIA	PEOPLE	DEMOGRAPHICS	POPULATION COMPOSITION	aborig3.gif	/n/burn3/australia	http://www.csu.edu.au/education/australia/gallery/	photo of an aboriginal culture scene
NATION	AUSTRALIA	PEOPLE	DEMOGRAPHICS	POPULATION COMPOSITION	aborig2.gif	/n/burn3/australia	http://www.csu.edu.au/education/australia/gallery/	photo of an aboriginal culture scene
REGION	SOUTH AUSTRALIA	GOVERNMENT	CHARACTERISTICS	CAPITAL	adelaide.gif	/n/burn3/australia	http://www.csu.edu.au/education/australia.html	photo of Adelaide, capital city of
REGION	SOUTH AUSTRALIA	GEOGRAPHY	ATTRIBUTES	FEATURES	flindrag.gif	/n/burn3/australia	http://www.csu.edu.au/education/australia.html	Flinders Range
REGION	TASMANIA	ECONOMY	INDUSTRY&TECHNOLO	AGRICULTURE	cheese.gif	/n/burn3/australia	http://www.csu.edu.au/education/australia.html	Tasmania's quality cheese
REGION	TASMANIA	GOVERNMENT	CHARACTERISTICS	CAPITAL	hobart.gif	/n/burn3/australia	http://www.csu.edu.au/education/australia.html	photo of Hobart, capital city of Tasmania
REGION	QUEENSLAND	GEOGRAPHY	MAPS		queenmap.gif	/n/burn3/australia	http://www.csu.edu.au/education/australia.html	map of Queensland, Australia
REGION	QUEENSLAND	ECONOMY	INDUSTRY&TECHNOLO	INDUSTRIES	sugarmil.gif	/n/burn3/australia	http://www.csu.edu.au/education/australia.html	Sugar mills in Queensland, Australia
REGION	QUEENSLAND	GOVERNMENT	CHARACTERISTICS	CAPITAL	brisbane.gif	/n/burn3/australia	http://www.csu.edu.au/education/australia.html	Aerial view of Brisbane, Queensland,
REGION	NORTHERN TERRITROY	PEOPLE	LIFESTYLE	RECREATION	fanybay.gif	/n/burn3/australia	http://www.csu.edu.au/education/australia.html	Fanny Bay Yatch Club, Darwin, Northern Territory,
REGION	NORTHERN TERRITROY	GEOGRAPHY	ENVIRONMENT	VEGETATION	kangpaw.gif	/n/burn3/australia	http://www.csu.edu.au/education/australia.html	Kangaroo Paw (Australian Wildflower)
REGION	NORTHERN TERRITROY	SERVICES	ATTRACTIONS	SCENIC ATTRACTIONS	ay_rock.gif	/n/burn3/australia	http://www.csu.edu.au/education/australia.html	Ayers Rock near Uluru, Northern Territory, Australia

VIEW	DIVISION	MAJCAT	MINORCAT	SUBCAT	FILENAME	AIMCAL.LOCAL AD	ADDRESS	COMMENTS
REGION	VICTORIA	ECONOMY	INDUSTRY&TECHNOLO	INDUSTRIES	carprod.gif	/n/burn3/australia	http://www.csu.edu.au/education/australia.html	Australian Motor Vehicle Production
REGION	VICTORIA	GEOGRAPHY	ENVIRONMENT	WILDLIFE	koalas.gif	/n/burn3/australia	http://www.csu.edu.au/education/australia.html	Koalas in Victoria's National Parks
NATION	AUSTRALIA	PEOPLE	DEMOGRAPHICS	POPULATION COMPOSITION	aborigin.gif	/n/burn3/australia	http://www.csu.edu.au/education/australia/gallery/	photo of an aboriginal culture scene
REGION	SOUTH AUSTRALIA	ECONOMY	INDUSTRY&TECHNOLO	AGRICULTURE	wine.gif	/n/burn3/australia	http://www.csu.edu.au/education/australia.html	grapes for wine making
REGION	NEBRASKA	GEOGRAPHY	ATTRIBUTES	FEATURES	streams.tif	/n/burn3/aim/nebraska		Nebraska permanent streams.
REGION	NEBRASKA	SERVICES	INFRASTRUCTURE	TRANSPORTATION	ne_m_rd.tif	/n/burn3/aim/nebraska		Nebraska major roads. Siplified from original DLG
REGION	NEBRASKA	SERVICES	INFRASTRUCTURE	TRANSPORTATION	major_rt.tif	/n/burn3/aim/nebraska	CALMIT	map of major roads in Nebraska with
REGION	NEBRASKA	GEOGRAPHY	ENVIRONMENT	LANDUSE	landcover.tif	/n/burn3/aim/nebraska		Nebraska Land Use/Land Cover
NATION	EGYPT	GOVERNMENT	SECURITY	EXTERNAL	nat_security.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	Egyptian national security issues
NATION	EGYPT	ECONOMY	COMMERCE&TRADE		for_trade.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	foreign trade
NATION	EGYPT	ECONOMY	COMMERCE&TRADE	TRADE BALANCE	bal_of_pay.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	balance of payments and foreign exchange
NATION	EGYPT	ECONOMY	PROFILE	EXTERNAL DEBT	debt.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	debt and restructuring of debt
NATION	EGYPT	GOVERNMENT			government.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	general description of Egyptian
NATION	EGYPT	GOVERNMENT	LEADERSHIP	STRUCTURE	rule_power.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	the dominant executive and the power elite

VIEW	DIVISION	MAJCAT	MINORCAT	SUBCAT	FILENAME	AIMCAL.LOCAL AD	ADDRESS	COMMENTS
NATION	EGYPT	GOVERNMENT	LEADERSHIP	STRUCTURE	sub-rule.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	the subordinate branches of government
NATION	EGYPT	GOVERNMENT	LEADERSHIP		party_elec.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	parties, elections, and controlling the mass political
NATION	EGYPT	GOVERNMENT	CHARACTERISTICS	RELATIONS	for_policy.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	Egyptian foreign policy
NATION	EGYPT	PEOPLE	DEMOGRAPHICS		populace.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	general demographic profile of Egypt
NATION	EGYPT	GOVERNMENT	SECURITY	MILITARY	milit_hist.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	Egyptian military heritage
NATION	EGYPT	GOVERNMENT	SECURITY	EXTERNAL	enemies.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	Egyptian security concerns and stratigic
NATION	EGYPT	GOVERNMENT	SECURITY	MILITARY	milit_life.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	the Egyptian military in national life
NATION	EGYPT	GOVERNMENT	SECURITY	MILITARY	arm_forces.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	general (and admiral) description of
NATION	EGYPT	GOVERNMENT	SECURITY	MILITARY	arm_for_prod.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	armed forces production; defense industry
NATION	EGYPT	GOVERNMENT	SECURITY	MILITARY	for_milt_ast.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	foreign military assisstance
NATION	EGYPT	GOVERNMENT	SECURITY	INTERNAL	int_security.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	Egyptian internal security
NATION	EGYPT	GOVERNMENT	LAW	LEGAL SYSTEM	crime.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	crime, punishment, judicial system
NATION	EGYPT	ECONOMY	PROFILE		res_manu.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	energy, mining, and manufacturing in
NATION	EGYPT				egypt_facts.txt	/n/burn3/aim/egypt	http://www.research.att.com/cgi-wald/dbaccess/4	1994 CIA Fact Book listing for Egypt

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NATION	EGYPT	SERVICES	TRAVEL	TRAVEL INFO	tour_off.txt	/n/burn3/aim/egypt	http://santos.doc.ic.ac.uk/~mmg/EgyptTourist.Office	list of phone numbers and address of
NATION	EGYPT	PEOPLE	HISTORY	MODERN	modern4_hist.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	Egypt's modern history: era of liberal
NATION	EGYPT	SERVICES	TRAVEL	TRAVEL INFORMATION	trav_adv.txt	/n/burn3/aim/egypt	gopher://gopher.stolaf.edu/00/Internet%20Resources	travel information advisories and
NATION	EGYPT	ECONOMY	INDUSTRY	AGRICULTURE	agriculture.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	Egyptian agriculture
NATION	EGYPT				profile.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	general description of Egypt.
NATION	EGYPT	PEOPLE	HISTORY	SURVEY	hist_setting.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	short historical setting of Egypt
NATION	EGYPT	PEOPLE	HISTORY	EARLY	ancient_hist.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	ancient history of Egypt
NATION	EGYPT	PEOPLE	HISTORY	EARLY	ptolemy_hist.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	early history of Egypt during Ptolemaic,
NATION	EGYPT	PEOPLE	HISTORY	EARLY	midieval_hist.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	midieval history of Egypt
NATION	EGYPT	PEOPLE	HISTORY	EARLY	ottoman_hist.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	Egyptian history under the Ottoman Empire
NATION	EGYPT	PEOPLE	HISTORY	MODERN	modern_hist.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	overview of Egypt's modern histroy
NATION	EGYPT	PEOPLE	LIFESTYLE	SOCIAL GROUPS	family.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	role of family and kinship in Egyptian society
NATION	EGYPT	PEOPLE	HISTORY	MODERN	modern3_hist.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	Egypt's modern history from occupation to
NATION	EGYPT	ECONOMY	LABOR	LABOR FORCE	labor.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	employment and wages in Egypt

CALdata

VIEW	DIVISION	MAJCAT	MINORCAT	SUBCAT	FILENAME	AIMCAL.LOCAL AD	ADDRESS	COMMENTS
NATION	EGYPT	PEOPLE	HISTORY	RECENT	recent1_hist.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	Egypt's history immediately following WWII
NATION	EGYPT	PEOPLE	HISTORY	RECENT	mubarak_hist.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	Egypt's recent history under H. Mubarak
NATION	EGYPT	PEOPLE	LIFESTYLE		society.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	general description of Egyptian society
NATION	EGYPT	GEOGRAPHY			geography.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	general description of Egyptian
NATION	EGYPT	PEOPLE	LIFESTYLE	SOCIAL GROUPS	social_org.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	Organization of Egyptian society
NATION	EGYPT	PEOPLE	LIFESTYLE	CUSTOMS	religion.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	religion in Egypt
NATION	EGYPT	SERVICES	EDUCATION	EDUCATION SYSTEM	education.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	education in Egypt
NATION	EGYPT	SERVICES	INFRASTRUCTURE	BASIC SERVICES	health&welfare.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	health and welfare system in Egypt
NATION	EGYPT	ECONOMY	PROFILE		economy.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	general description of Egytian economy
NATION	EGYPT	ECONOMY	PROFILE		econ_devel.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	structure, growth, and development of
NATION	EGYPT	ECONOMY	PROFILE	POLICY	econ_gov.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	Egyptian government role in its economy
NATION	EGYPT	PEOPLE	HISTORY	MODERN	modern2_hist.txt	/n/burn3/aim/egypt	gopher://umslvma.umsl.edu/11/LIBRARY/GOVDOCS	Egypt's modern history from period of

C. Significant Events - Final Quarter

1. Completion of the TV prototype

The TV version of the prototype was completed on August 18, 1995. Arrangements were made with 3DO to provide a loaned development platform to enable the AIM Institute to demonstrate the TV version at the ARPA/SISTO Symposium at the end of August.

As previously noted, the system was generated during its demonstration at the symposium.

2. Completion of the PC prototype

The first iteration of the PC version of the prototype was completed on August 25, 1995. The PC version was demonstrated at the ARPA/SISTO Symposium with the assistance of the Omaha office of SAIC.

The PC version generated interest and several positive comments, particularly from individuals engaged in crisis planning/management or in distance learning. Modifications and enhancements to the PC version were undertaken between September 1 and December 1, 1995, based on the feedback received at the symposium. All software bugs were then eliminated prior to the January 31, 1996, PC prototype deadline.

3. ARPA/SISTO Symposium (August 28-31, Chantilly, VA)

A MAP Project team delegation attended the ARPA/SISTO Symposium in Chantilly, Virginia from August 28 to August 31 for the purpose of demonstrating both versions of the MAP system to government officials and to software researchers working with ARPA.

MAP team members attending included:

Doug Perry	AIM Institute
Tim Hammelman	AIM Institute
Kandace Bragg	AIM Institute
James Swanson	AIM Institute
Tom Hart	SAIC
Jay Parsley	SAIC
Rick Bullard	SAIC
Connie Needham	SAIC
Dave Worden	Studio 23

Members staffed the AIM Institute project demonstration area and attended related workshop sessions throughout the four-day symposium. Additionally, relationships were developed with other researchers for the purpose of enhancing future versions of the MAP system with tools developed under related research initiatives.

4. Omaha NEW MEDIA Expo (January 30-31,1995)

The PC version of the MAP prototype was highlighted during the Omaha NEW MEDIA Expo held in Omaha on January 30 and 31, 1996. The event provided a forum for discussion of MAP's development process, an opportunity to expose the MAP concept to a commercial audience, and a chance to guage opinion.

A conference brochure is included as *Appendix E.*

III. BUDGET

A. Grant Disbursements

All grant disbursements, totalling $750,000.00 were received. Interest of $9,759.01 was accrued.

Grant Disbursements	$750,000.00
Interest Accrued	$ 4,087.80
Total Income	$754,087.80

B. Actual Expenditures

Figure 1 is a list of the actual expenses incurred and charged to the MAP project. Substantiating detail is on file at the AIM Institute and can be reviewed at the inquirer's convenience.

TOTAL ACTUAL PROJECT EXPENDITURES - FINAL

Compensation and Benefits	$134,638.39
Travel/Lodging/Meals	$ 47,937.04
Equipment & Software	$ 58,187.03
Materials & Supplies	$ 3,911.27
Purchased Services	$ 39,858.61
Subcontractors	$350,647.19
Indirect Costs	$109,149.26
Total Expenditures	$744,328.79
Unused Funds	$ 9,759.01

Figure 1: Total Actual Project Expenditures - Final

IV. NEXT STEPS

A. Market Testing

The original MAP plan of action called for an extensive round of market testing and evaluation of the prototype over the US WEST broadband-to-the-home interactive communications system. Midway through our prototype design process we decided to develop two versions of the MAP system, one for TV applications and one for PC applications. As previously stated, US WEST's termination of interactive TV market testing has made a test delivery of the TV version impossible. We are continuing to work with US WEST to determine the feasibility of a market test for either the TV version or an enhanced broadband PC version of the MAP system.

Our plan was to have a second round of focus groups evaluate the PC version in early September. Since we decided to modify the PC version based on feedback received at the ARPA/SISTO symposium, we canceled these focus group sessions. The revised version of the PC prototype was completed at the end of November and the focus groups have not been rescheduled. Funding that was earmarked for the focus groups was reallocated to the design revision effort.

If funding can be found, focus groups conducted by Creighton University will be set up to receive market feedback on the redesigned PC prototype.

Regardless of whether additional funding is obtained or not, the AIM Institute will be demonstrating the redesigned PC version of the prototype throughout 1996 and user reactions and feedback will be documented. Already, valuable input was gained from a demonstration of the MAP prototype at the Omaha NEW MEDIA Expo between January 30 through the 31, 1996.

B. Intelligent Tools

Significant enhancements can be made to the MAP system by incorporating intelligent tools that search, analyze, format, and display data from heterogeneous sources. Preliminary discussions have begun with V.S. Subrahmanian of the University of Maryland regarding the possibilities of collaborating on future versions of the prototype and incorporating some of his work with hybrid knowledge bases.

Opportunities for collaboration exist with other I*3 researchers. We will pursue these ideas and opportunities as time permits and as funding sources are confirmed.

C. PC Broadband Application

A meeting was held with US WEST product managers interested in pursuing PC related services over their broadband to-the-home network. If continued funding for the development of the PC version of MAP can be arranged, there are potential application areas that can be explored with US WEST.

D. Enhanced Presentation and Analysis Capability

Another area that can add value to the existing MAP system is that of the visual display of data. Currently, the majority of the analysis and reformatting of data for graphical display is done manually. Off-the-shelf tools exist that can be integrated into the MAP system to further automate the process of presenting information.

V. OBSTACLES

A. Funding

The greatest obstacle to the continued development of the MAP system is funding. We will continue to pursue ARPA funding through participation in appropriate BAA announcements and through the ARPA grant process. ARPA synergies exist in the areas of crisis management and distance learning applications.

The Defense Mapping Agency has expressed some interest in our navigational front-end and interface expertise associated with geographic information. We will follow-up with DMA on their specific needs during January, 1996.

We will also pursue funding through private foundations and commercial partnerships.

B. Personnel

After funding, the next greatest roadblock is human resources.

Assuming that funding can be secured, we will continue to use the staff of the Omaha office of SAIC for systems integration and GIS expertise. Studio 23 will also continue to serve as our multimedia and interface consultants.

Interns hired by the AIM Institute will provide the infrastructure to accomplish the various routine tasks associated with data collection, reformatting, and inventory.

However, the recruitment of a full-time Principal Investigator will continue to be the highest personnel priority.

Report on
AIM Institute Map Project Program
Resolution of Memory Problems
By
Charles Quentin Knox
and Jesse A. Kirby

For: **Douglas Perry**
Tim Hammelman

The Map Project program developed by Studio 23 for Aim Institute would freeze or issue a GPF message after clicking on 13 objects in the main window. The challenge was to determine the cause(s) of failure and to correct them if possible.

To understand this report thoroughly, it is important to understand the internal workings of the Map Project program from a high level perspective. The program consists of an executable file, **MAPPROTO.EXE** and several supporting dynamically linked libraries (**DLL's**). The DLL, **NOT4APW.DLL,** was developed as an interface for **MAPPROTO.EXE** to a database server. The relationship of **MAPPROTO.EXE** and **NOT4APW.DLL** is one of the client/server type. **MAPPROTO.EXE** is a client of the **NOT4APW.DLL.**

The client, **MAPPROTO.EXE**, makes all of its database queries to the database server, via the routines in **NOT4APW.DLL**. The routines in **NOT4APW.DLL** format the queries, establish a socket to the network database server, process the response and establish the windows necessary for the display of the information in the appropriate media format. The following is the flow of the process from the user to the final display of information.

1. The user "clicks" on a map location.
2. **MAPPROTO.EXE** identifies the map location and forms a default query for news concerning the location. It makes a call to the **NOT4APW.DLL** using the Start_Query function.
3. **NOT4APW.DLL** Start_Query function formats the request, establishes a socket to the database server, and transmits the request to the server.
4. The server responds with a summary of media types that are available in the database for the country selected on the map.
5. **NOT4APW.DLL** routines place the response in a buffer available to the **MAPPROTO.EXE**.
6. The **MAPPROTP.EXE** analyzes the response and activates appropriate buttons on the GUI for each type of information available.
7. The user selects the media type desired for display.
8. **MAPPROTO.EXE** requests a description of the files available for display for that media type.
9. **NOT4APW.DLL** Start_Query function formats the request, establishes a socket to the database server, and transmits the request to the server.
10. The server responds, placing a text file for access in a known location on the server.
11. **NOT4APW.DLL** routines read the file, creates a list box window for display in the GUI, and displays the description information.
12. **MAPPROTO.EXE** displays a "DONE" button on the GUI for the user to signal when this single session is complete.
13. The user selects the desired descriptive material.
14. **NOT4APW.DLL** routines form a request to the server, establishes a socket, and requests the file.
15. The database server places the requested file on the known network drive location.

16. **NOT4APW.DLL** calls the appropriate application to display the requested file. It also creates the appropriate window for the display of the information.
17. The user examines the information and depresses the "DONE" button when desired.
18. **MAPPROTO.EXE** issues the "KILL_TEXT" command to **NOT4APW.DLL.**
19. **NOT4APW.DLL** routines clear out the windows created for the transaction and awaits the next Start_Query command from the **MAPPROTO.EXE.**

In the original program, the routines allocated memory for the information displays, unconditionally, every time a Start_Query was issued. As a result, usually memory for 10 - 20 display sessions would be allocated before even one display ever occurred. This memory was never de-allocated. Eventually, available memory was totally allocated, and the program would fail after 13 "clicks" of the mouse on the Map Project display.

As a rule, the developer of a DLL is obligated to allocate memory for the client but, the client is obligated to free the memory when its operation in that memory is complete. The client, **MAPPROTO.EXE**, would dutifully free the memory upon the depression of the "DONE" button after a display of information. However, it could only free the active memory which had been allocated immediately prior to the display of the information. Any prior allocations were totally ignored.

Our goal was to insure that the memory was allocated prior to the display of information, and allow the client to free the memory when the user was done viewing the information. Yet, we were also determined to insure that no memory was allocated until the point it was needed. We removed all code that allocated memory during the actual queries. This prevented over 90% of the allocations that were taking place in the old code.

The logic of the existing code assumed that certain memory would be allocated upon entry. We considered restructuring the logic at first, but as we became more familiar with the program, we felt we could work as well with in the structure and still accomplish what was needed to insure system stability. We examined each function used in the various processes, such as printing, download, and related functions, and removed code that allocated memory. The intent here was two-fold. First, this guaranteed the information available was indeed related to the information displayed to the user. Secondly, we forced the code to rely on memory which had already been allocated, rather than allocate more memory.

Likewise, where we removed allocations, we also provided checks to insure that the code did not execute without the correct memory allocations in force. The print function, for example, had to have window memory allocated even if there was nothing to print. Otherwise, the function would cause a GPF. In such places, we generated code which would circumvent the operation, issuing a friendly advisory to the user that the function call was not appropriate because no information is available to print.

The final result of these actions is that every memory allocation is followed by a paired memory de-allocation when the "DONE" button is depressed by the user. The only exception to this is the initial allocation that takes place when **NOT4APW.DLL** is loaded, and possibly one other allocation that is generated for the edit window. These two items should be automatically de-allocated as the program terminates.

In addition to these changes, we also found arrays of information created by various objects that were not being properly deleted when the objects were destroyed. We added code in the destructors for these objects so the allocations woul be properly deleted as the objects were destroyed by legitimate client calls.

Another alteration we performed was inspired early on in the initial review of the project. I noticed parameters that should be easily modified by users were hard coded in the program. These parameters included the socket addresses and file locations. I removed the hard coded parameters and moved them to the **MAPPROTO.INI** file to be located in C:\windows. The contents of this file is as follows:

```
[WSocket]
Address=139.121.105.103          ;Network Address
Version=1.1                      ;Winsock Versiion

[Files]
Description=e:\map\desc.txt      ;Location of data
                                 description file
AVIData=e:\map\outfile.avi       ;Location of video data file
WAVData=e:\map\outfile.wav       ;Location of sound wave file
TIFData=e:\map\outfile.tif       ;location of TIF formatted
                                 file
TXTData=e:\aim\outfile.txt;      ;Location of text file

[Aux Programs]
TextEditor=c:\windows\notepad.exe;          ;Location of text editor
Imager=c:\windows\msapps\msimager\imager.exe ;location of imager
MultiMedia=mplayer                          ;Location of media player
```

This file can be modified using any text editor (such as Notepad) to reflect the appropriate parameters for the network, data base and data base file names and locations.

Caveats to the user:

We did all we could to adhere to the conventions of client/server relationships in the **NOT4APW.DLL**. This means we provided the memory allocations as the client application demanded, however we left the responsibility of clean-up to the client application. The client software accomplishes this task via the KILL_TEXT call to the DLL. The KILL_TEXT call is initiated by the program user when the "DONE" button is pushed after viewing data retrieved from the server.

On any given query, the description list box may display multiple descriptions of information that can be accessed. The user may display any and all of these descriptions without depressing the "DONE" button. However, **it is paramount that the user depress the "DONE" button before initiating a new query sequence.** Failure to do so will eventually result in a GPF because the client application will not be given the opportunity to clean up the memory it has requested.

Other issues and concerns:

In the process of testing and debugging, we found a few items that we could not repair because the responsible code is in the **MAPPROTO.EXE.**

1. An user may use the search function to go directly to Omaha, NE on the map. Once there, one may execute the same search sequence to get to Melbourne, Australia. The search will fail and bring up the default world map and issue the default query for world news to the database server. This is entirely controlled by **MAPPROTO.EXE.** The **NOT4APW.DLL** has no part in this operation until the request is made for world news. Also, once this sequence has been initiated, the search sequence will not work again for that session. The user must unload the Map Project and start again to use the search function.
2. **MAPPROTO.EXE** fails to call the KILL_TEXT function after a download. This resulted in some anomalous behavior. We took the liberty to force the call to keep the system stable. However, we recommend that the **MAPPROTO.EXE** application be changed to initiate the call properly. We will then change the code in the DLL to allow the client application to take responsibility for that clean-up.
3. The **MAPPROTO.EXE** is also responsible for giving the user some standard status clues, such as the hourglass icon when the system is busy. There are a number of files, (especially

TIF's and Avi's) that take some time to load. The user has no clue that the system is busy and may grow impatient. The user may begin "clicking" various things to try to get a response from the software, and ultimately may cause the system to be come "confused."

4. When the Map Program requests files for display, the server locates the files and transfers them to the location (E: drive) that is accessible to the client. The server is also responsible for renaming the file to "outfile.txt," or "outfile.avi", etc., as appropriate for the media type, so the Map Project application can find it easily. On occasion the database server fail to rename the files. The Map application does not issue any message in that case, nor does it attempt to process anything. But the user is left wondering what happened to the request. We could change the **NOT4APW.DLL** code to notify the user that the file was not found. However, some work needs to be performed on the server database application to insure the files are renamed for the Map Project application.
5. The original calls to create new objects in memory were without proper checks to see if the allocations were successful. We left most of the calls that way. However, this could result in the ultimate crash of the system (GPF) if the system runs so low on memory resources that it cannot allocate memory.

Source Code Changes:

The source code for all changes implemented are stored in a "zipped" archive, c:\9635??\not4apw.zip, on the AIM Institute computer we used for testing. We also have the source in our possesion until we are told that the source has been permanently secured into AIM archives.

Borland C++ 4.52 Compiler

The Borland C++ 4.52 compiler used for this work is the property of AIM Institute and will be returned to Mr. Tim Hammelman immediately.

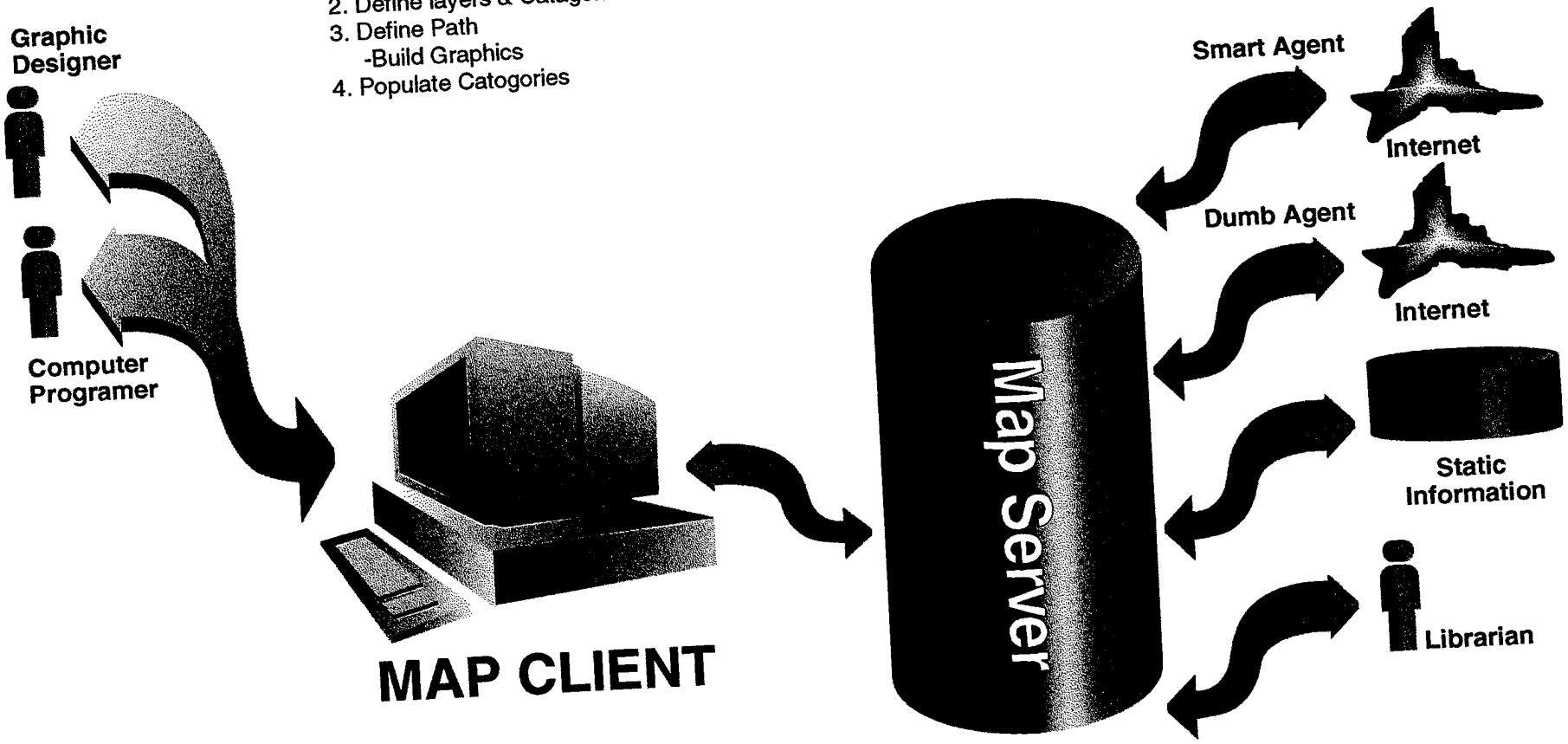
DISTRIBUTION LIST

		Copies:
1.	Dr. David Gunning Project Officer Advanced Research Projects Agency (ARPA/SISTO) 3701 North Fairfax Avenue Arlington, VA 22203-1714	2
2.	Robert L. Bachman Office of Naval Research Resident Representative San Diego Regional Office 4520 Executive Drive, Suite 300 San Diego, CA 92121-3019	1
3.	AIM Institute 1314 Douglas On-The-Mall Omaha, NE 68102	3

AIM INSTITUTE
MULTIMEDIA ACCESS PROTOTYPE
SYSTEM DEVELOPMENT PROCESS

STEPS

1. Organize Info Structure
2. Define layers & Catagories
3. Define Path
   -Build Graphics
4. Populate Catogories



Science Applications International Corporation
An Employee-Owned Company

January 2, 1996

Mr. Doug Perry
AIM Institute
1314 Douglas On-The-Mall
Omaha, Nebraska 68102

Dear Doug:

The attachments to this letter constitute SAIC's inputs to the AIM MAP Final Report associated with ARPA Grant MDA 972-94-1-0014 through Contract Modification 1. These inputs cover the period from 1 July 1995 to 1 December 1995. Also discussed is the pending contract Modification 2 which covers the period 1 December 1995 to 30 May 1996.

Initial Contract

Attachment 1 provides the MAP Master Schedule through 11 September 1995. It encompasses the SAIC and overall program activities up to the point of the first contract modification on July 1, 1995 (depicted by the solid line). These activities were previously reported in the 1 April to 30 June 1995 Quarterly Report. In summary, activities included:

1. Vigorous pursuit of an interactive TV prototype in preparation for the intended US West unveiling of an Omaha Broadband capability on 21 June 1995.

2. Delay of MAP system specification efforts for the PC prototype until US West had completed definition of the interfaces required to implement system hardware and software.

3. Harvesting a more robust data set that would ultimately be used by both ITV and PC prototype versions.

These efforts quickly produced the first ITV prototype by mid June 1995. Unfortunately, US West canceled its broadband announcement. This resulted in a total MAP project replan and subsequent subcontract modifications (Mod #1) effective July 1, 1995.

Contract Mod #1

The contract changes in Mod #1 redefined the remaining scope of work for the MAP Project in general, and for SAIC in particular. In accordance with these changes, a new primary objective was established by AIM. This required preparation of robust Demonstration Capabilities for both the ITV and PC prototypes by August 28, 1995 for presentation at the ARPA Symposium in Washington, DC. SAIC's role as system integrator and GIS lead were redefined at that time. Specifically, SAIC's role was expanded to include development of an ORACLE-based data server, and residual funding from the original contract was reallocated to transition the PC prototype capabilities onto new hardware procured by AIM.

As a result of these contract modifications:

1. The ITV version was significantly improved and presented at the ARPA symposium using a US West provided 3DO engine and proprietary development software.

2. The PC prototype was redefined without the US West interfaces. In order to meet the symposium deadlines, SAIC then furnished a Sun SPARC10 Data Server and provided facilities for Studio 23 to support implementation of a PC-based multimedia front end. This configuration (see Figure 1) was subsequently used at the ARPA symposium in support of the MAP demonstrations.

3. An ORACLE DBMS was developed and populated with over 800 data sets, including video, text, imagery, and sound.

The Mod #1 Master Schedule is shown at Attachment 2 and covers the actual activities performed during the period of 1 July through 18 September 1995. The development activities were considered "Best Effort" in an effort to provide an operational prototype at the symposium. Several significant development issues related to user I/F navigation and ORACLE object creation/access were identified and addressed to the extent permitted during the approximate six-week development schedule. Ultimately, both ITV and PC prototypes were successfully demonstrated at the symposium. However, the PC version was extremely fragile.

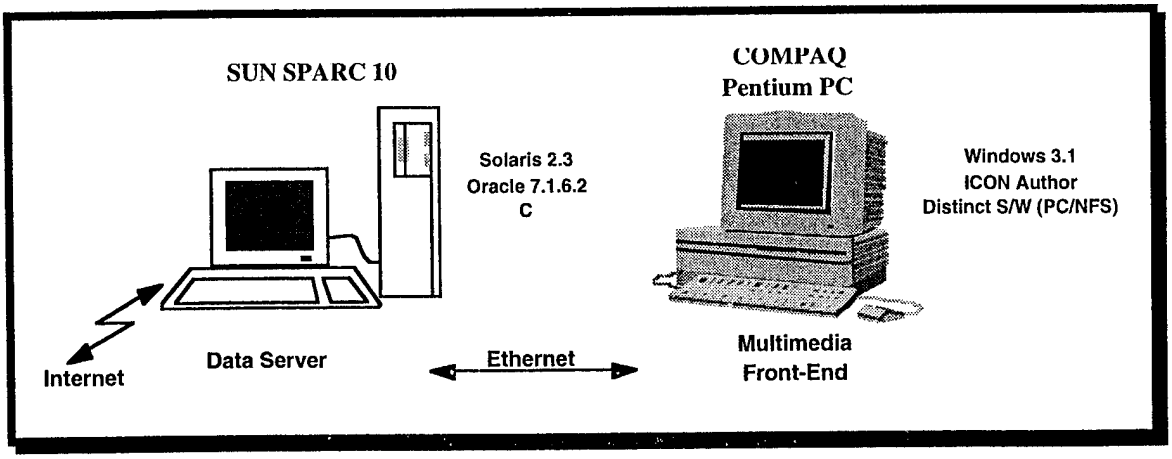


Figure 1
PC Version As Demonstrated at the ARPA Symposium

Following the symposium, an additional replan session was conducted by AIM in early September. The sole objective of this replan was to identify ways to stabilize and enhance the PC prototype. It was also decided to add a military scenario with associated data sets (for Belize) to the approximate 800 data sets previously loaded in

the database. Finally, a decision to purchase new hardware was postponed by AIM pending success in the above efforts. This replan was directed by AIM as shown in the MAP Master Schedule at Attachment 3. It covers the period from 18 September to 1 December 1995.

During this period, the PC/Sun interface and communications software were successfully improved and several other modifications related to the multimedia interface were implemented. (Refer to AIM Demo Schedule and Checkpoint Memo dated 22 Sept 95).

Note that efforts were delayed several times due to associate contractor personnel availability (D. Worden), but final testing yielded a far superior PC prototype than was initially demonstrated at the symposium. Residual prototype problems were documented in a MAP "Bug Book" and reviewed with AIM at regular reviews and demonstrations.

During the course of wrapping up the PC prototype, AIM requested SAIC to purchase a database server that would enable transition of the SAIC-developed software and team-developed data sets to AIM. The equipment was purchased on 28 November 1995.

Contract Mod #2

Because of the impact of previous redirection of effort, and, in order to accommodate the transition of the prototype to AIM, on 4 December 1995 a proposed contract modification was delivered to AIM to enable SAIC to:

- Configure the new hardware (received 21 December 1995)
- Transition the server software to the new hardware
- Train AIM staff in the use of the hardware and software
- Provide documentation on the server, DB and other relevant topics

As of 2 January 1996, this contract modification is still pending formal AIM approval. Nonetheless, efforts are proceeding with a projected completion no later than 13 January 1996.

Attachment 4 provides additional detail of efforts performed by SAIC during the period ending 1 December 1995.

Sincerely,

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

Thomas M. Hart

THOMAS M. HART
Assistant Vice President
Manager, Applied Technology Division

TMH:cjz

Attachments: As Stated

FINAL REPORT

ATTACHMENT 1

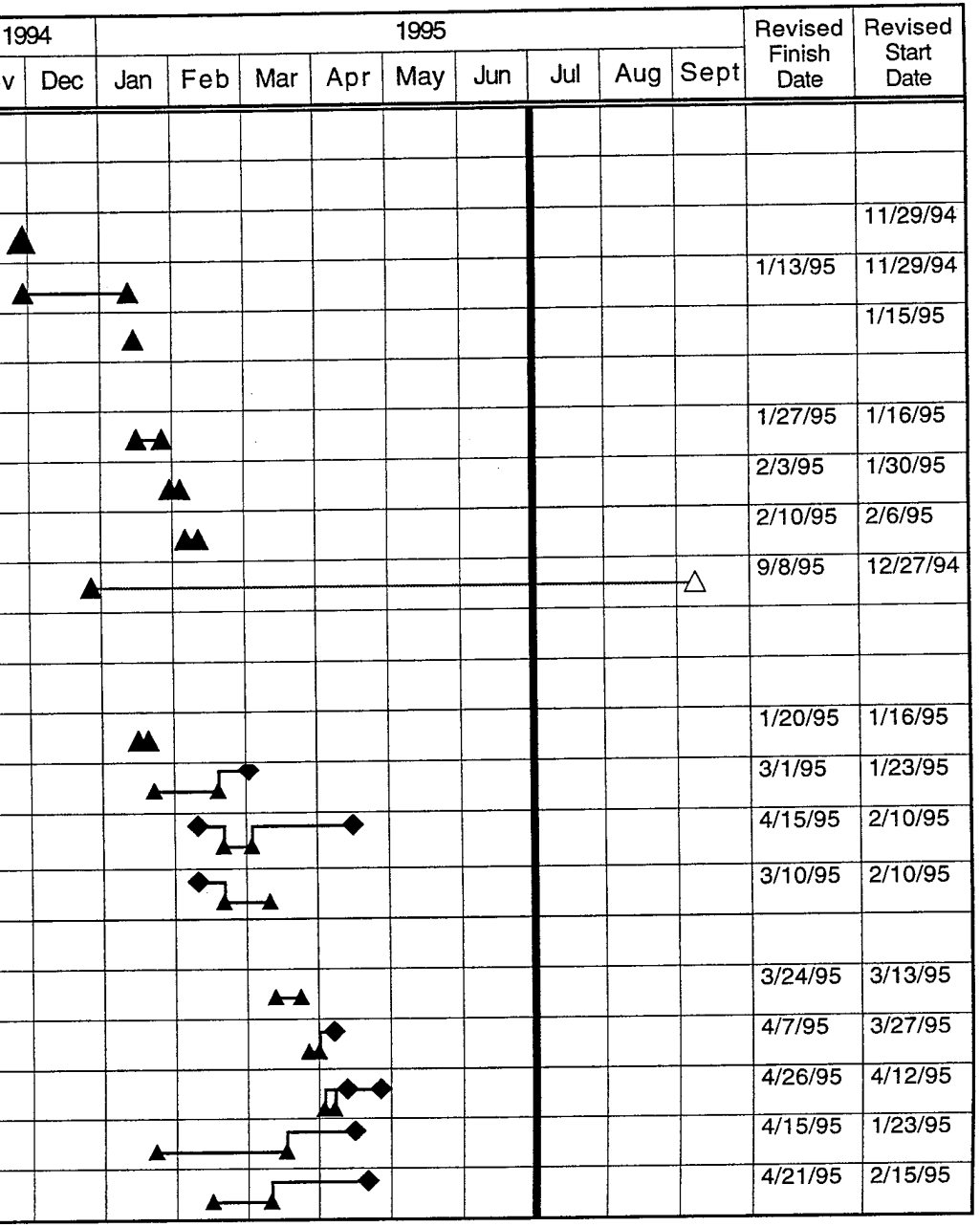
MAP MASTER SCHEDULE

MAP MASTER SCHEDULE

(17 Nov 94 to 30 Jun 95)

Final Version

Activity Name	Start Date	Finish Date	Revised Finish Date	Revised Start Date
Dev AIM MAP Prototype				
Manage Program				
Kickoff	11/29/94			11/29/94
Submit Cost Estimates	11/29/94	1/13/95	1/13/95	11/29/94
Issue Subcontracts	1/15/95			1/15/95
Develop Int Plan				
Dev Draft Int Plan	1/16/95	1/27/95	1/27/95	1/16/95
Review Draft Int Plan	1/30/95	2/3/95	2/3/95	1/30/95
Pub Final Int Plan	2/6/95	2/10/95	2/10/95	2/6/95
Coordinate Team Activities	12/27/94	9/8/95	9/8/95	12/27/94
Define Requirements				
Research Market				
Identify Initial Scenarios	1/16/95	1/20/95	1/20/95	1/16/95
Research User Needs	1/23/95	2/17/95	3/1/95	1/23/95
Recommend DBs	2/20/95	3/3/95	4/15/95	2/10/95
Identify GIS Technology	2/20/95	3/10/95	3/10/95	2/10/95
Develop CONOPS				
Dev Draft CONOPS	3/13/95	3/24/95	3/24/95	3/13/95
Rvw Draft CONOPS	3/27/95	3/31/95	4/7/95	3/27/95
Pub Final CONOPS	4/3/95	4/7/95	4/26/95	4/12/95
Identify MM Technology	1/23/95	3/17/95	4/15/95	1/23/95
Obtain Developer Kit	2/15/95	3/11/95	4/21/95	2/15/95



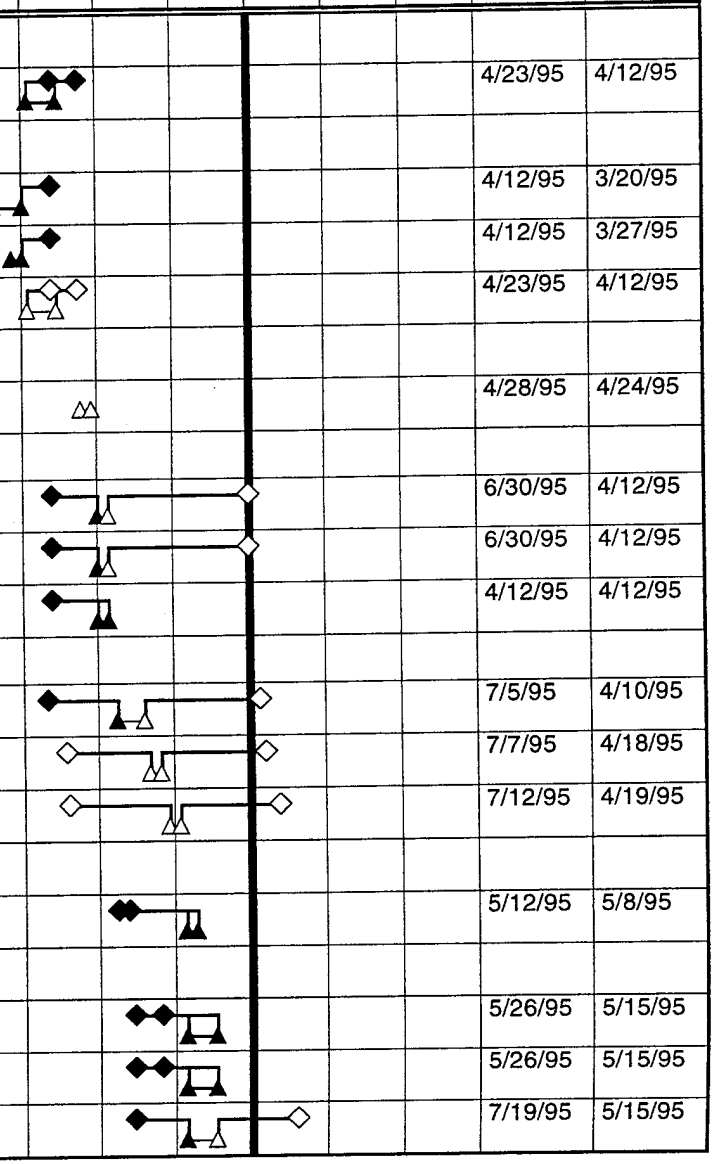
Atch 1

MAP MASTER SCHEDULE

(17 Nov 94 to 30 Jun 95)

Final Version

Activity Name	Start Date	Finish Date	Revised Finish Date	Revised Start Date
Design Prototype				
Develop Data Mgt Plan	4/3/95	4/14/95	4/23/95	4/12/95
Develop Multimedia Plan				
Evaluate Multimedia Tech	3/20/95	3/31/95	4/12/95	3/20/95
Select Multimedia Tech	3/27/95	3/31/95	4/12/95	3/27/95
Produce Multimedia Plan	4/3/95	4/14/95	4/23/95	4/12/95
Develop Sys Spec				
Develop Eval Criteria	4/24/95	4/28/95	4/28/95	4/24/95
Select Components				
Select Hardware	5/1/95	5/5/95	6/30/95	4/12/95
Select Software	5/1/95	5/5/95	6/30/95	4/12/95
Select Data	5/1/95	5/5/95	4/12/95	4/12/95
Publish Sys Spec				
Generate Draft Spec	5/8/95	5/19/95	7/5/95	4/10/95
Review Sys Spec	5/22/95	5/26/95	7/7/95	4/18/95
Generate Final Spec	5/29/95	6/2/95	7/12/95	4/19/95
Build & Test Prototype				
Prepare Prototype Site	6/5/95	6/9/95	5/12/95	5/8/95
Procure Components				
Obtain Hardware	6/5/95	6/16/95	5/26/95	5/15/95
Obtain Software	6/5/95	6/16/95	5/26/95	5/15/95
Obtain Data	6/5/95	6/16/95	7/19/95	5/15/95



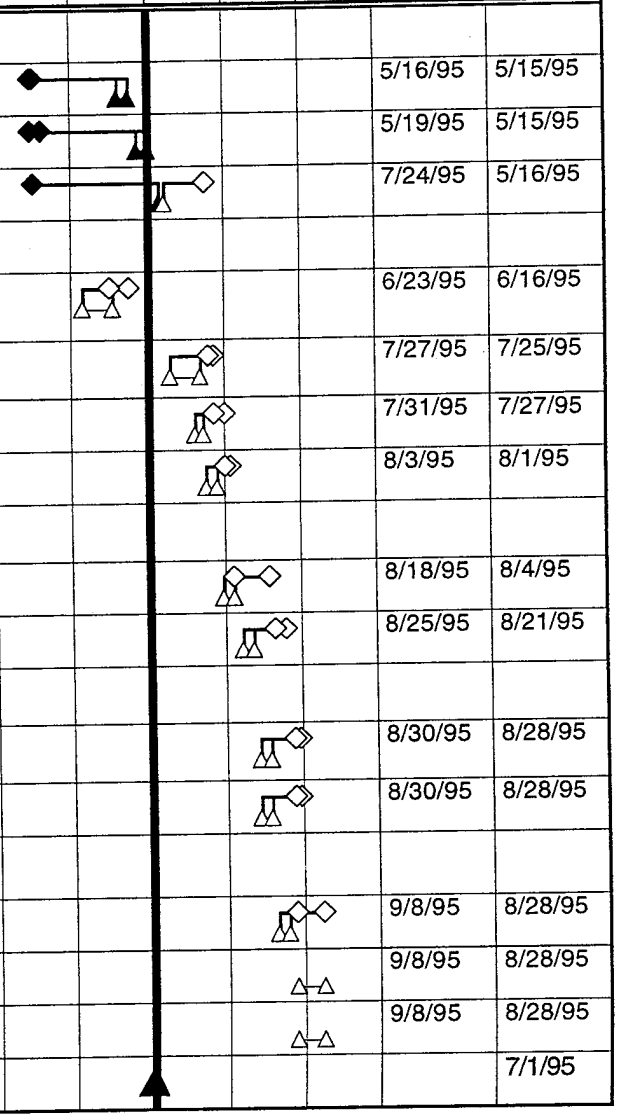
Atch 1

MAP MASTER SCHEDULE

(17 Nov 94 to 30 Jun 95)

Final Version

Activity Name	Start Date	Finish Date	Revised Finish Date	Revised Start Date
Assemble Components				
Assemble Hardware	6/19/95	6/23/95	5/16/95	5/15/95
Implement Software	6/26/95	6/30/95	5/19/95	5/15/95
Build Databases	7/5/95	7/7/95	7/24/95	5/16/95
Test Prototype				
Develop Test Plans	6/5/95	6/16/95	6/23/95	6/16/95
Test Subsystems	7/10/95	7/21/95	7/27/95	7/25/95
Test Interfaces	7/19/95	7/22/95	7/31/95	7/27/95
Test System	7/24/95	7/28/95	8/3/95	8/1/95
Demonstrate Prototype				
Refine Scenarios	7/31/95	8/4/95	8/18/95	8/4/95
Present Demos	8/7/95	8/11/95	8/25/95	8/21/95
Evaluate Demos				
Marketing Perspective Eval	8/14/95	8/18/95	8/30/95	8/28/95
Tech Perspective Eval	8/14/95	8/18/95	8/30/95	8/28/95
Document Results				
Update Project Objectives	8/21/95	8/25/95	9/8/95	8/28/95
Document Project Results	8/28/95	9/8/95	9/8/95	8/28/95
Develop Future Plans	8/28/95	9/8/95	9/8/95	8/28/95
Contract Modification #1	7/1/95			7/1/95



Atch 1

FINAL REPORT

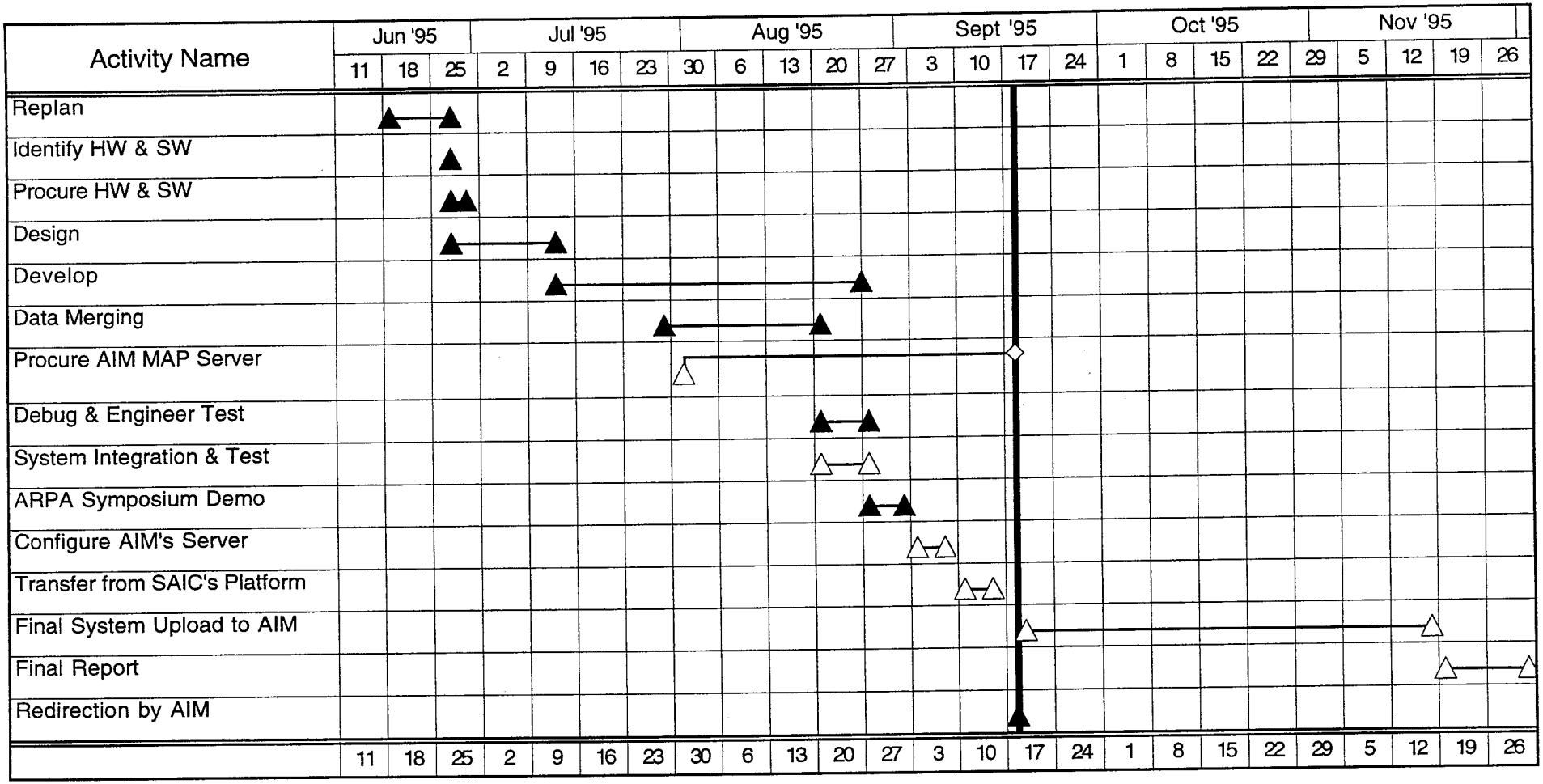
ATTACHMENT 2

MOD #1 MASTER SCHEDULE

MAP MASTER SCHEDULE

(15 Jun 95 to 18 Sep 95)

Contract Mod #1
Final Version



Atch 2

FINAL REPORT

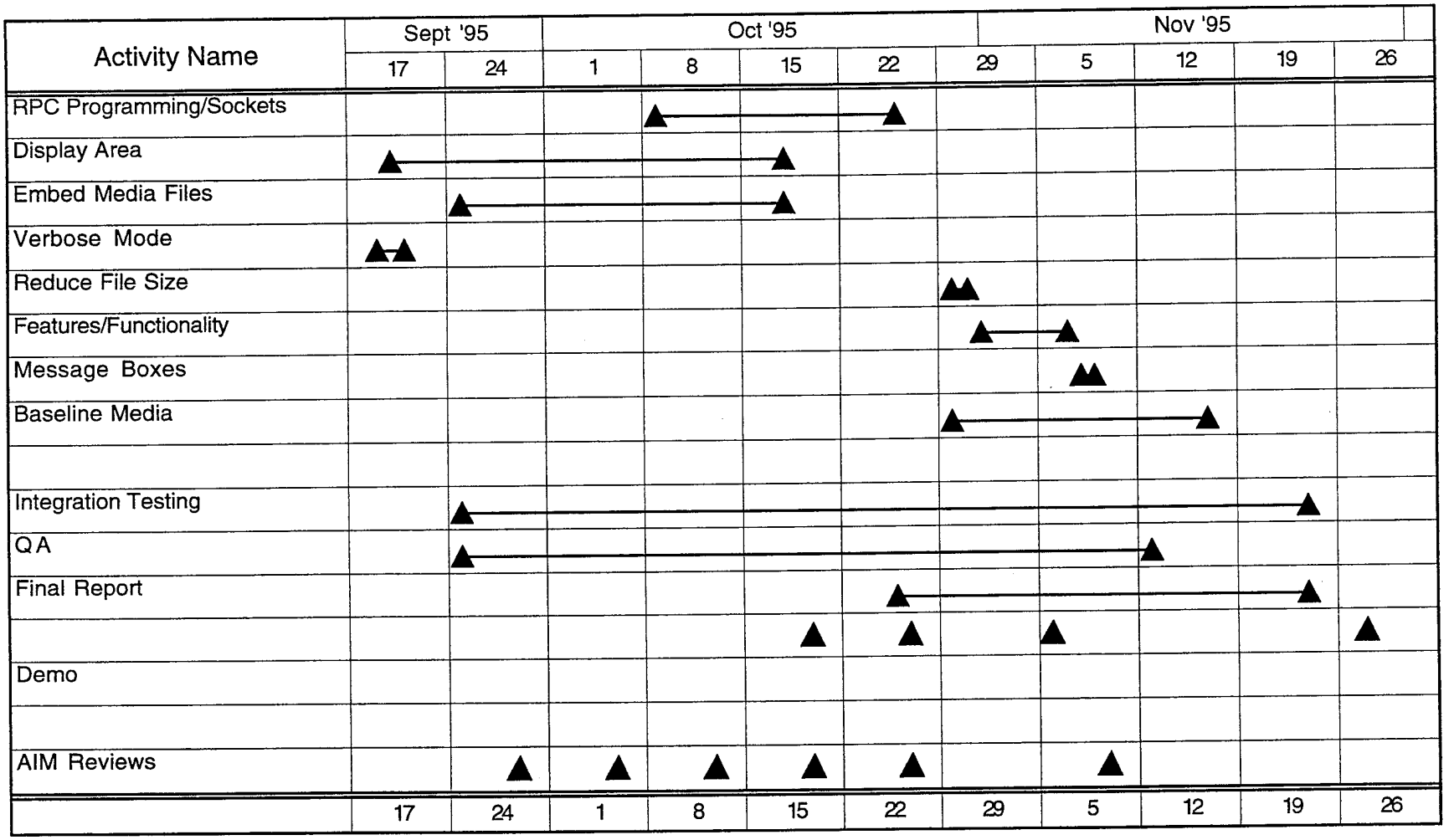
ATTACHMENT 3

MAP MASTER SCHEDULE (REV #1)

MAP MASTER SCHEDULE

(18 Sep 95 - 1 Dec 95)

Contract Mod #1
Revision #1
Final Version



APPLIED INFORMATION MANAGEMENT INSTITUTE

September 11, 1995

Mr. Robert L. Bachman, AGO
Office of Naval Research
Resident Representative
San Diego Regional Office
4520 Executive Drive, Suite 300
San Diego, CA 92121-3019

Re: Grant No. MDA972-94-1-0014

Dear Mr. Bachman:

Per your telephone conference with Kathleen Berg Eagen of our office last week, this will confirm our request for a no-cost extension of the above-referenced ARPA grant until December 1, 1995. The grant was originally scheduled to expire on September 11, 1995. We had previously requested an extension of the grant from the ARPA Project Officer, Dr. David Gunning, by correspondence dated June 28, 1995, a copy of which is enclosed for your reference. We understand that the present letter is necessary to complete the paperwork to implement the extension.

We currently have $297,869 of grant funds remaining. These funds will be used to complete the grant project as originally proposed. A revised budget and description of work remaining is enclosed.

If you have any questions or you need additional information to implement this extension, please contact the undersigned at #(402) 422-5408 or Kathleen Berg Eagen at (402) 422-3467.

Once again, thank you for your continued assistance in the administration of this grant.

Sincerely,

Douglas J. Perry
Project Director

Enclosures

1314 Douglas On-the-Mall ◆ Omaha, NE 68102 ◆ (402) 422-3525 ◆ FAX (402) 422-3693

Applied Information Management Institute
Multimedia Access Prototype

June 28, 1995

Dr. David Gunning
Project Officer
Advanced Research Projects Agency (ARPA/SISTO)
3701 North Fairfax Avenue
Arlington, VA 22203-1714

Dear Dr. Gunning:

This letter is to request a no-cost extension for grant MDA972-94-1-0014. The current completion date for this grant is 11 September, 1995. I would like to request an extension until 1 December, 1995.

The extension is requested to accommodate the following:

- schedule delays in obtaining information and tools from U S WEST to develop the interactive television version of the prototype.
- reorganization of project management due to the resignation of Jim Richstein, the Research Associate.
- a desire to integrate some of the tools in the I^3 program to increase the robustness and functionality of the prototype.

Sincerely,

Douglas J. Perry
Multimedia Center Director

cc: Douglas M. Pollock
Contracts Management Office
Advanced Research Projects Agency

AIM Institute
Multimedia Access Prototype (MAP) Project

Budget Status 8/31/95

Original Budget	$ 750,000
Expenditures Through 8/31/95	452,131
Balance Available 8/31/95	**$ 297,869**

Future Expenditures:

Balance Due Subcontractors	$ 113,516
Hire Replacement Research Personnel	57,000
Purchase of Sun File Server	30,000
Compensation & Benefits DP & JS 9/1-11/30/95	15,760
U S WEST Technical Support Contract	13,000
ARPA Symposium Travel	10,500
ARPA Symposium Shipping & Misc.	2,000
Video Documentation	3,500
Focus Groups - Round 2	3,000
Misc. (Travel to Denver & DC)	5,000
Indirect Cost Rate	44,593
TOTAL	**$ 297,869**

3701 NORTH FAIRFAX DRIVE
ARLINGTON, VA 22203-1714

CONTRACTS MANAGEMENT OFFICE

August 8, 1995

DJP

Office of Naval Research
San Diego Regional Office
ATTN: AIM Institute Administrative Grants Officer
4520 Executive Drive, Suite 300
San Diego, CA 92121-3019

Dear Administrative Grants Officer:

Reference is made to the enclosed letter from Applied Information Management Institute (AIM), dated June 28, 1995, requesting an extension of Grant No. MDA972-94-1-0014, at no increase in cost to the Government.

Dr. David Gunning, ARPA Project Officer, in recommending approval of the Grantee's request, has indicated that the extension is in the best interest of the Government and will not cause the Government to suffer any material harm.

Accordingly, you are hereby authorized to negotiate and execute the appropriate supplemental agreement to implement this extension. *

Yours truly,

Douglas M. Pollock
DOUGLAS M. POLLOCK
Grants Officer

Enclosure

cc: D. Perry (AIM)

* TC Robert Bachman 8/16
– out of office until 8/21;
message left in his Voice
Mail (#(619) 677-6477) re
pending issues: (1.) Extension of grant;
(2.) audit requirements – audit confirmed for 94/9-

re UCB DJP
re #1

I am to call him back week of 8/28 re #2

DEPARTMENT OF THE NAVY
OFFICE OF NAVAL RESEARCH
SAN DIEGO REGIONAL OFFICE, 0246
4520 EXECUTIVE DRIVE, SUITE 300
SAN DIEGO, CA 92121-3019

GRANT NO. N00014-91-1-0014
MODIFICATION NO: A00001
R&T s400022srd02
S.O. CODE: 1132D
DISBURSING CODE: N00179
AGO CODE: N66018
CAGE CODE: 50854
P.I.: P. E. Williams

RESEARCH GRANT

GRANTEE: UNIVERSITY OF NEBRASKA LINCOLN
303 ADMINISTRATION BUILDING
LINCOLN NEBRASKA 68588-0430

AUHORITY: 10 U.S.C. 2358 AS AMENDED, AND 31 U.S.C. 6304

The Purpose of this Modification is to extend the Period of Performance at no additional cost to the Government. Therefore, paragraph 2 of this grant is modified as follows:

2. PERIOD; The grant is for the period 01 JULY 1992 through 31 December 1995.

UNITED STATES OF AMERICA
FOR THE OFFICE OF NAVAL RESEARCH

BY: Robert A. Bachman

DATE: 09-01-95

cc: Douglas
Papers

ADVANCED RESEARCH PROJECTS AGENCY
3701 NORTH FAIRFAX DRIVE
ARLINGTON, VA 22203-1714

Grant No.: MDA972-94-1-0014
Modification No.: 0002
ARPA Order No.: N/A

Grantor: Advanced Research Projects Agency
Contracts Management Office
3701 North Fairfax Drive
Arlington, VA 22203-1714

Grantee: Applied Information Management (AIM) Institute
1314 Douglas on the Mall
Omaha, Nebraska 68102-1816

This modification is for administrative purposes only. The period of performance is extended through April 1, 1996.

UNITED STATES OF AMERICA
FOR THE ADVANCED RESEARCH PROJECTS AGENCY

BY: Algeria X. Tate
(GRANTS OFFICER)

DATE: February 8, 1996

ACCEPTED BY: [signature]
(GRANTEE)

TITLE: Director - Multimedia Center

DATE: February 12, 1996

Omaha World-Herald
16 Friday, March 8, 1996

U S West Ends Interactive TV Test, Not Cable

BY MELINDA NORRIS
WORLD-HERALD STAFF WRITER

U S West Communications Inc. has dropped its interactive TV test in Omaha, saying the service would cost more than what consumers would be willing to pay for it.

Roger Stuhmer, U S West spokesman in Omaha, said the cost of delivering interactive TV would have been substantially higher than the $25 per month the average consumer pays for cable television service.

"The technology, at this point in time, is so expensive it would price the product out of the normal consumer's range," Stuhmer said.

However, U S West will continue with the cable television portion of the trial.

TeleChoice subscribers in the west Omaha test area will not be affected, U S West said. TeleChoice has 10,000 customers.

Interactive TV was supposed to make the television a tool for ordering movies, playing games and purchasing groceries or clothing.

Since September, U S West has been testing the technology in the west Omaha homes of U S West employees and consumers who volunteered.

With the touch of a button on the television remote control, the volunteers could choose from a menu of movies and instantly call up the feature on their TV screens.

Although the interactive test reached up to 125 homes, it never was marketed commercially. Initially, U S West hoped to offer interactive television later this year to TeleChoice subscribers.

Sol Trujillo, U S West Communications Group president and chief executive officer, said in an interview last week that demand for interactive service is strong, but it is centered around the personal computer — not the television.

"I think the future of the interactive television that most of us were discussing two-and-a-half, three years ago has changed," Trujillo said. "We talked about interactive in the TV context, rather than, perhaps more appropriately saying, most of us want interactivity in our homes ... Today we are seeing the huge growth in terms of interactivity requirements — higher broadband requirements, band width requirements — in the home. But centered around the PC.

"Will it ultimately be on TVs? Yes. Will it be like we were thinking two or three years ago? Probably not, other than a little bit further down the road."

Trujillo noted recent announcements about new TV set-top boxes that would mingle the abilities of televisions and personal computers.

"As more of the TV-based set-top box deployments and technology breakthroughs and cost-point breakthroughs evolve, that will become more important," he said. "But right now, PCs are kind of where the game is at."

Stuhmer declined to reveal the cost of the interactive trial, but noted that stockholders, not telephone ratepayers, are paying for it.

In a filing with the Federal Communications Commission last fall, U S West said it spent $60 million installing the cables and equipment necessary for delivering both the cable television and interactive services in Omaha.

U S West is the latest company to pull the plug on interactive technology.

In October, AT&T Corp. shelved plans to offer access to such services as bill-paying via television after consumers balked at the price.

Pacific Telesis Group and Bell Atlantic Corp. previously scaled back plans to offer interactive television services.

Cox Communications Inc., which also has said it had plans to introduce interactive TV in Omaha, said it is focusing on the personal computer.

"Interactivity is very high in our plans," said Michael Kohler, communications manager at Cox in Omaha. "It remains to be seen where television sets fit into the picture.

"The home PC is becoming more popular ... and perhaps that is where the interactive battle will take place for video as well as other bits of data."

AIM-MAP Project Meeting Minutes
July 12, 1995

AIM Institute MAP Project Meeting
July 12, 1995

1. Doug Perry called the meeting to order at 8:00 AM, in the 15th Floor Conference Room, US West Building. Present were:

Ault, James
Hart, Tom
Houchin, Kevin
Karuppan, Muthu
McMains, Doug
Needham, Connie
Perry, Doug
Rodvelt, Ron
Swanson, James
Sweeney, Bob
Zink, Larry

2. Status of the Interactive TV Version of the Prototype. Perry reported that he expects a team to visit the US West Software Facility in Boulder, CO (tentatively, July 18-20). Goals of the trip are:

(1) Successfully run the prototype on a US West test system (3DO set-top box); and
(2) video tape the demonstration to show to other interested groups in the future . The demo team will probably include Doug Perry, Chris Fletcher, and James Swanson. Doug McMains and Perry will handle the video taping.

3. Revised Schedule and Workplan for the PC Prototype Version. Tom Hart reported that hardware and software have been identified and ordered. Hardware shipments should be complete this week. The C development environment is in-house; ORACLE should arrive this week. The database definitions are complete, and SAIC expects to complete the design of the structure this week; performance enhancement modifications will follow the integration tests with Studio-23's front-end. Kevin Houchin reported that the first communications tests (accessing SAIC WWW site from Studio-23) was successful. He reported that Studio-23 staff members are working with software vendors to clarify TCP-IP protocols. Hart then reported that the data module priorities (for the ARPA Symposium demonstration script) have been set. The demonstration should include the following components:

(1) the transaction processor that supports the user front-end;
(2) a pseudo e-mail module, that will appear to allow entry of a message, appear to make the appropriate connections, and inform the author that the message was received by the target system;
(3) a chronological processor, designed to harvest selected images, storing a set of 6-8 images to allow a simulation of weather flow; and
(4) a module to harvest tabular data from selected Internet sites, convert the data to visual images for the user.

TIMELINE: Hart expects to have the base system ready at least seven days before the ARPA demo, allowing time for system integration testing and final modifications. The system will involve two or more units linked via ethernet to demonstrate the broadband capability. A telephone link to the Internet may be included.

4. Results of the "tiger-team" data format efforts. Kevin Houchin reported that they are working with Connie Watson (SAIC) to complete the definition. Larry Zink asked for suggestions about the next steps for UNL-CALMIT. He reported they have gotten data for several hundred additional sites, and need instruction. After discussion, it was agreed they would proceed to format the new data as per Watson's data definitions in the CONOPS, so that it will be available for the next phase of activity. James Swanson will be able to select any of these new sites and complete the cosmetic formatting required for inclusion in the current demonstration.

5. Criteria for Baseline Prototype Functionality. Kevin Houchin reported on the current status of the front-end module. The basic navigation process is in place, and will include (1) the six icons, (2) a search window, and (3) pull-down menus. At any given level of a search an icon will appear ***if, and only if,*** the relevant database address contains live data [if the relevant database address does not contain live data, no icon will appear for that topic]. Other functions available in the prototype will include the e-mail module, a module to allow the user to download material, a module to allow printing, and a context-specific help-module. Each available path in the demo will include text, photos, audio, and video.

6. ARPA/SISTO Symposium, August 28-31. Doug Perry distributed a detailed description of the symposium, including registration forms for the demo team. Cost constraints will make it necessary to limit the team to six or (at most) eight participants. However, AIM has made airline reservations for nine people to guarantee space. The demo team will include some of the following: Doug Perry, Kevin Houchin, Dave W., Tom Hart, Connie Needham, Jay Parsley., Tim Hammelman., and James Swanson. Those who may be participating need to provide the completed forms to Doug Perry as soon as possible. Connie Needham will coordinate the planning for the demo. She will also provide a WWW address where ARPA has posted details of the conference and the exhibits.

7. Feedback from Trip to DC. Perry reported that he, Bob Sweeney, James Swanson, and Jim Richstein completed several meetings to pursue future funding during their last DC trip. They delivered the quarterly report to Dave Gunning (ARPA Project Manager for AIM-MAP), and requested an extension to allow more time to complete the last phase of the market research (reaction to the actual prototype). Since the request does not ask for additional funding, Perry is optimistic. Gunning ran a preliminary version of the prototype on his Macintosh, and seemed impressed. Overall, the consensus remains: money is tight. However, interest in this project appears to be increasing.

Perry reported they also met with the following:

(1) Congressman John Christensen,
(2) a new mapping group with the State Department,
(3) Carol Ann Bishoff (of Senator Kerry's office),
(4) Chris Straub (Senator Kerry's aide from the Senate Select Intelligence Committee),
(5) Dave Gunning (ARPA/SISTO),
(6) V. S. Subrahmanian (AI researcher from Univ. of Maryland, who is developing a search engine for working with disparate databases, who could really use a front-end like AIM-MAP),
(7) Ed Thompson (Dave Gunning's boss, Director of ARPA/SISTO),
(8) Don Johnson (Department of Commerce, and

AIM-MAP Project Meeting Minutes
July 12, 1995

(9) Joe Markovitz (of the CIA --who deals with unclassified information such as is found in the CIA Factbook).

Thompson suggested other ARPA administrators and researchers with whom AIM staff should meet; Gunning is arranging those meetings.

(8) Plan for Demonstrating the Prototype to Market Audiences. Since US West will probably not be able to provide facilities for demonstration of the broadband-to-the-home version of the AIM-MAP prototype before the expiration of the contract, Perry reported plans to videotape the demonstration at the system-test at Boulder, CO later this month. Selections from that tape will allow us to show interested parties how the image will appear, and how the subscriber can interact with the system. Later, when US West is ready to proceed, AIM will still be in a position to deliver the prototype to homes in the test area.

(9) Perry adjourned the meeting in the conference room, and we moved to the office where James Swanson demonstrated the current PC version, including the Van Sandt image. After appropriate oohs and aahs --and a few questions about details and possible improvements -- Swanson and Kevin Houchin agreed to meet and complete final modifications to the templates.

(10) Next meeting: Wednesday, August 2, 1995 at 8:00 AM.

Submitted by James T. Ault, III
Secretary du jour

AIM-MAP Project Team Meeting
August 2, 1955

1. Mr. Perry called the meeting to order at 8:00 AM in the conference room of Studio 23, 3035 South 72nd Street, Suite 200. Attending were:

Jim Ault
John Gleason
Kevin Houchin
Muthu Karuppan
Connie Needham
Jay Parsley
Doug Perry
Ron Rodvelt
James Swanson
David Worden
Larry Zink

2. Doug Perry reported that he had corrections for the minutes of the preceding meeting at his office, and would forward them to Jim Ault.

3. Status of the interactive TV version of the prototype.
James Swanson has the second version available for demonstration. At present, the demos must be run in development mode, since we do not yet have a 3DO box. Doug Perry reported that he should have word later today about the status of a 3DO box for the ARPA demo. Swanson will continue fine-tuning this version.

Doug Perry reported that he, Chris Fletcher, and Doug McMains were in Boulder, CO for three days, demonstrating the prototype to US West, and video-taping the demonstration for use in other venues. Perry reported that US West technical people were impressed at the amount of progress made in such a short period of time. They also met with Lucy Vento (Manager, Broadband Product Development, Broadband & Media Services, US West Communications, Inc., 1999 Broadway, 28th Floor, Denver, CO, voice- 303-965-5140, fax- 303 965-0820)

4. Status of the PC version of the prototype.
Jay Parsley reported the following items.

A. SAIC needs <<ALL EXACT>> specifications for all equipment that will be used in the ARPA demonstration.

B. SAIC needs an ethernet hub for the demonstration; estimated cost is <$200.00.

C. Connnectivity with Studio 23 (and any other participants that are not a part of SAIC's corporate network) is a problem. SAIC's network includes a

firewall that prohibits external NFS mounts. For the ARPA demo, SAIC will transport host and establish an ethernet network at the site. This same problem will complicate the second phase of the focus groups. SAIC is willing to host them. However, there will be a limited number of PC's available, and location could be a barrier to participation (since ALL of the participants live in the US West target area).

D. Studio 23 is working on a Windows version (compiled from Authorware).

E. The transaction processor is 95% complete. The search routing is written in C on a Sun platform.

F. Oracle database has been touchy. The problem involves Binary Large Objects (BLOBs). If Oracle technical support cannot resolve the problem, SAIC plans to load the address of each BLOB on the file server.

Perry reminded the team that we need a "text" example in the demo; the example should be some kind of real-time source. Ault agreed to find one and post the URL on the AIM-MAP list.

Parsley will distribute the ACCESS database as an attachment to a message to the AIM-MAP list.

5. Plans for the ARPA/SISTO demo.

A. Perry reported that he has negotiated an agreement with American Business Lists to include one or more of their products in the PC version. He is working with Bob Toff.

B. The attendee list will include:

Kandace Bragg
Rick Bullard
Tim Himmelman
Kevin Houchin
Connie Needham
Jay Parsley
Doug Perry
James Swanson
Dave Warden

C. Connie reported that all equipment will ship Thursday, August 24, 1995 to SAIC's DC office. Tom Hart will be in DC and will rent a van to handle equipment.

Connie reported that she has been unable to get any specification's about the booth from ARPA. Perry will try to get a contact person who can supply the information she needs.

D. The conference is being held at:

Westfields
14650 Conference Center Drive
Westfields, VA 22021
(703) 818-0300
(800) 635-5666
(703) 818-3655 fax

E. Doug Perry will define two billboards for the demo booth (one for each version, PC and TV). Studio 23 will produce the billboards. Perry asked that Studio 23 produce additional copies of the brochure for use in the booth.

6. Final Reports

Doug Perry requested that final reports for the technical groups by submitted in mid-September, with September 30, 1995 as the deadline. Final reports of the focus groups will be due October 31, 1995.

Exact dates for the focus groups cannot be set until Perry is able to resolve availability of a 3DO box for the TV version. His goal is have one before the DC trip. If he is able to obtain one, he will try to arrange to keep it into September to allow for its use with the follow-up focus groups. He will advise us as soon as he has any concrete information so focus groups can be scheduled.

7. Roundtable discussion of further opportunities.

Perry reported that he hopes to be able to keep the team (basically) intact to pursue additional opportunities. Suggestions of contacts we should pursue include the following:

A. Lucy Vento, US West Broadband

B. Department of Commerce - the enhanced PC version; for those who can't afford PC connections, the interactive TV version.

C. ARPA - Stage II. Perry will pursue partnering with one or more other ARPA contractors. He is especially interested in contractors with sophisticated AI-based search engines, which are too difficult for ordinary individuals to use. Our prototype could be a front-end.

D. Briefing Package development tool kit. Given interest from both the government and the private sector, there might be an opportunity in developing interactive multimedia briefings for executives, defense department, state department, etc.

E. Service Bureau. There may be a commercial opportunity for someone to provide a value-added subscription service (analgous to American Business Lists, and others) that harvests information from public sources and presents it in a useful form to subscribers.

F. Commerical Partners. Given the race for content, existing (or proposed) commercial providers might be interested in another partner. Microsoft, AOL, US West, Prodigy, (etc.) should be contacted to define opportunities.

G. Return to GIS focus. The Federal Government is making more material available, but it is hard for most people to use.

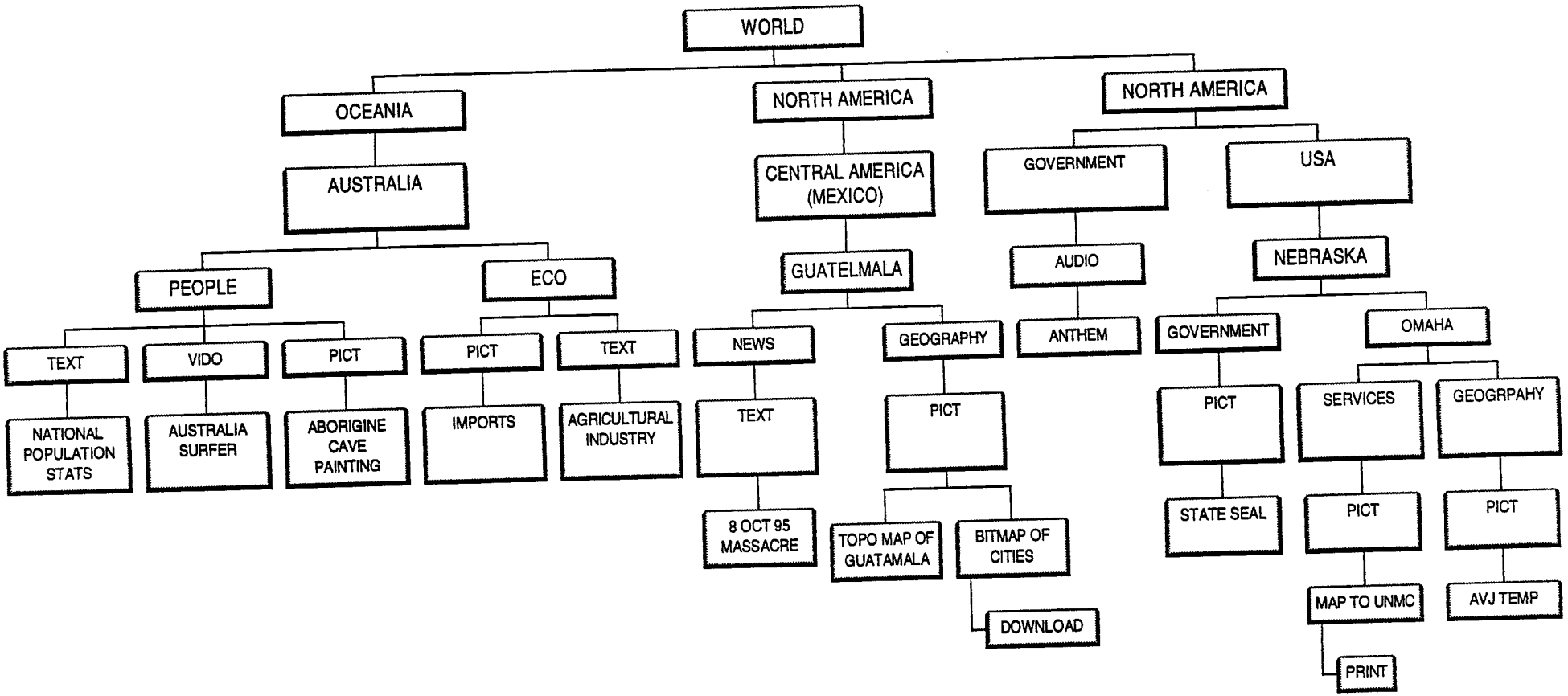
8. Next Meeting will be at SAIC, August 17, 1995, from 8-10 AM. Topics will include:

A. Finalize DC plans.
B. Finalize focus group plans.
C. Continue "brainstorming" future opportunities.

Respectfully submitted,

James T. Ault, III
August 3, 1995

MAP NAVIGATION



PROJECT SUMMARY

ORGANIZATION:
Applied Information Management Institute
1314 Douglas On-The-Mall
Omaha, NE 68102
402-422-3525
fax 402-422-3693
SUBCONTRACTORS:
Creighton University; Data Transmission Network Corp.; McMains, Omaha; NECAD, Inc.; Science Applications International Corp.; Studio 23; University of Nebraska-Lincoln, Center for Advanced Land Management Information Technology.
PRINCIPAL INVESTIGATOR:
Douglas J. Perry, dperry@unomaha.edu,
(402)-422-5408, fax(402)-422-3693
TEAM MEMBERS / GRADUATE STUDENTS:
James K. Richstein
James Swanson
Ron Bruder
SUBTITLE:
Multimedia Access Prototype
EXECUTIVE SUMMARY:
The Multimedia Access Project (MAP) project was the result of a grant from the Advanced Research Projects Agency. The project will create a user-friendly, multimedia-based prototype that would increase accessibility to the government's geographic information databases. The project will be a test bed evaluation of distributed and collaborative access to open source government information. The results of the initial test bed evaluation will assess and validate likely standards for use in DoD, government, public and commercial services
OBJECTIVE:
The following are the stated objectives for this project:
(1) Provide Information technology support to government agencies for crisis planning applications.
(2) Provide the AIM Institute with the local infrastructure required to participate in the National Information Infrastructure(NII).
(3) Deploy new technologies for presenting selected geographic data in a multimedia presentation format.
(4) Distribute the geographic information over a broadband network to a substantial population.
(5) Assess and validate likely standards for use in DoD, government, public, and commercial information service systems.
(6) Prepare for further commercial development and generalization of such systems and services.
(7) Collect evaluation data on:
a. queries received from users

b. response, latency, and transmission times
c. system and source failures
d. user(accessors) satisfaction levels
(8) Evaluate the test.
(9) Provide public access to all evaluation data.

APPROACH:
This effort will employ state-of-the-art, off-the-shelf technologies to create a prototype for an integrated geographic decision support system capable of searching public and private databases for data relevant to the inquiry, converting this data into usable, organized information, and presenting this information in a visually enhanced, interactive format. The most critical design variable will be ease-of-use.
The prototype will serve as a geographic decision support system for government decision makers. It will also test the delivery of geographic information using the broadband-to-the-home trial established by U S WEST in Omaha, Nebraska.
The project work is divided into four functional areas; 1) market research and analysis, 2) geographic information systems, 3) multimedia presentation technologies and 4) systems integration. A virtual company of Omaha area businesses and educational institutions will be formed to build the prototype. A working relationship will be established with U S WEST to develop a system of delivering information over their broadband interactive television network. An enhanced pc-based version of the prototype will be developed based on feedback from market research efforts targeted at government decision makers and consumers in the U S WEST trial area. Both versions of the MAP prototype are scheduled to be demonstrated at the ARPA/SISTO symposium in August, 1995.

PROGRESS:
The virtual company has been formed and consists of the subcontractors noted previously. The initial market research to determine a baseline of services to offer as part of this system has been performed. Members of the team have been trained on the U S WEST development software which will be used to build the interactive television prototype. The initial design of the interface has been completed and will be used in the interactive television version. (This interface will be explored with focus groups to determine its effectiveness.) In order to deliver a wide variety of information to the end user, a data inventory is being developed for use in the initial demonstrations of the MAP project. A data cataloging and indexing scheme has been developed to facilitate display of information in a logical manner. The design has been consolidated into a Concept of Operations (CONOPS) document and a prototype architecture has been developed.

PRODUCTS: none at this time

FY95 ACCOMPLISHMENTS:
April, 1995 - The CONOPS and information indexing system have been developed for the prototype. This process included defining an architecture that integrates interactive

television and personal computer-based applications.

May, 1995 - Formalized relationship with U S WEST. Received training on proprietary tools and applied the authoring tools to the MAP scheme. Initiated technical and policy discussions relative to providing government information over a pc-based broadband system.

PUBLICATIONS: An article has been submitted to the IEEE Transactions on Engineering Management titled "The Transfer and Commercialization of Information Technology: Technological Incrementalism vs. Escalating Consumer Expectations." This publication is currently in the referee and acceptance process.

DATE PREPARED: June 29, 1995

ADMINISTRATIVE DATA

1. ARPA ORDER NUMBER:
5L10

2. BAA NUMBER:
N/A

3. CONTRACT/GRANT NUMBER:
MDA972-94-1-0014, MOD 0001

4. AGENT:
ONR

5. CONTRACT TITLE:
Multimedia Access Prototype

6. CONTRACTOR/ ORGANIZATION:
Applied Information Management Institute

7. SUBCONTRACTORS:
Creighton University; Data Transmission Network Corp.; McMains, Omaha; NECAD, Inc.; Science Applications International Corp.; Studio 23; University of Nebraska-Lincoln, Center for Advanced Land Management Information Technology.

8. CO-PRINCIPAL INVESTIGATORS:
Douglas J. Perry

9. ACTUAL START DATE:
September 12, 1994

10. EXPECTED END DATE:
September 11, 1995

11. FUNDING PROFILE:

11.1 Current Contract:
$750,000

11.2 Options:
none

11.3 Total funds provided to date for all years: $525,000
Total funds expended to date $310,583.02
As of date 22 June, 1995

11.4 Date Total current funding will be expended:
11 September, 1995

11.5 Funds required in FY96:
Budget planning is currently under way, a funding estimate will be available by 1 August, 1995.

SIGNIFICANT EVENTS

The concept of an easy-to-use hardware and software system for accessing open source information from disparate, heterogeneous data sources forms the basis for the demonstration system known as MAP. The MAP prototype will be capable of searching georesource databases, converting data into useable information and presenting the information in a visually enhanced, interactive, multimedia format. Aesthetically pleasing and intuitive in nature, this geographic interface will provide comprehensive accurate and timely information about world situations to both high level government policy makers at their offices and citizens in their homes.

In the multimedia environment of the MAP prototype, the user can watch a video clip, view satellite imagery, or listen to an audio track, all on the same topic. The information is logically organized into the following categories: 1) government, 2) economy, 3) people, 4) geography, 5) services and 6) news.

Market research has been conducted in Washington D.C. with government officials and in Omaha with focus groups of consumers. The research provided the basis for an initial concept model. The model has been demonstrated to 100 attendees of the AIM annual meeting in March, 1995 and in several small private briefings.

The concept model involves a prototype developed for delivery over the U S WEST

broadband-to-the-home trial in Omaha using a set-top box appliance and a second prototype developed for delivery over the internet using a pc appliance. The set-top box version has been completed and will be demonstrated at a special U S WEST open house later this summer. The pc version is under development and will be demonstrated at the ARPA SISTO symposium, August 28 - 31 along with the interactive television prototype.

FY 96 EVENTS

In 1996, we hope to produce an enhanced version of the prototype for both interactive television and broadband pc applications. We plan to incorporate I3 tools in the enhanced broadband pc system with an emphasis on adding functionality through agent and wrapper technology. Additionally, we plan to conduct market research and analysis on the enhanced systems to determine how closely the two products meet the needs of the users.

TECHNOLOGY TRANSITION

An initial plan is in place to work with other I3 researchers to incorporate their integration tools into the MAP system and to export our front-end design expertise to their projects. The combination of an easy-to-use customer interface with a robust set of tools for searching, analyzing and combining information will provide a powerful decision support tool to high level government policy/decision makers.

The same system, modified for deployment over a broadband-to-the-home interactive television network offers the potential of educating the public on world situations in new ways. Additionally, easy access to open source government information will spawn entrepeneurial activity in the information industry.

The "Multimedia Access Prototype"system is a product of the AIM Institute in Omaha, Nebraska.
The interactive television version of the prototype requires the following minimum hardware and software to function:
Any Macintosh computer,
Any color monitor,
12 MB of RAM,
16 MB of available space on the hard disk for the Authoring software
System 7.0
AppleScript extension (pre-System 7.5)
Macintosh Drop and Drag extension (pre-System 7.5)
Dragging Enabler extension (pre-System 7.5)
The pc version of the prototype requires the following minimum hardware and software

to function:
Any Personal computer and color monitor,
access to the internet
For further information, contact
Doug Perry
402-422-5408
dperry@unomaha.edu

QUAD CHARTS

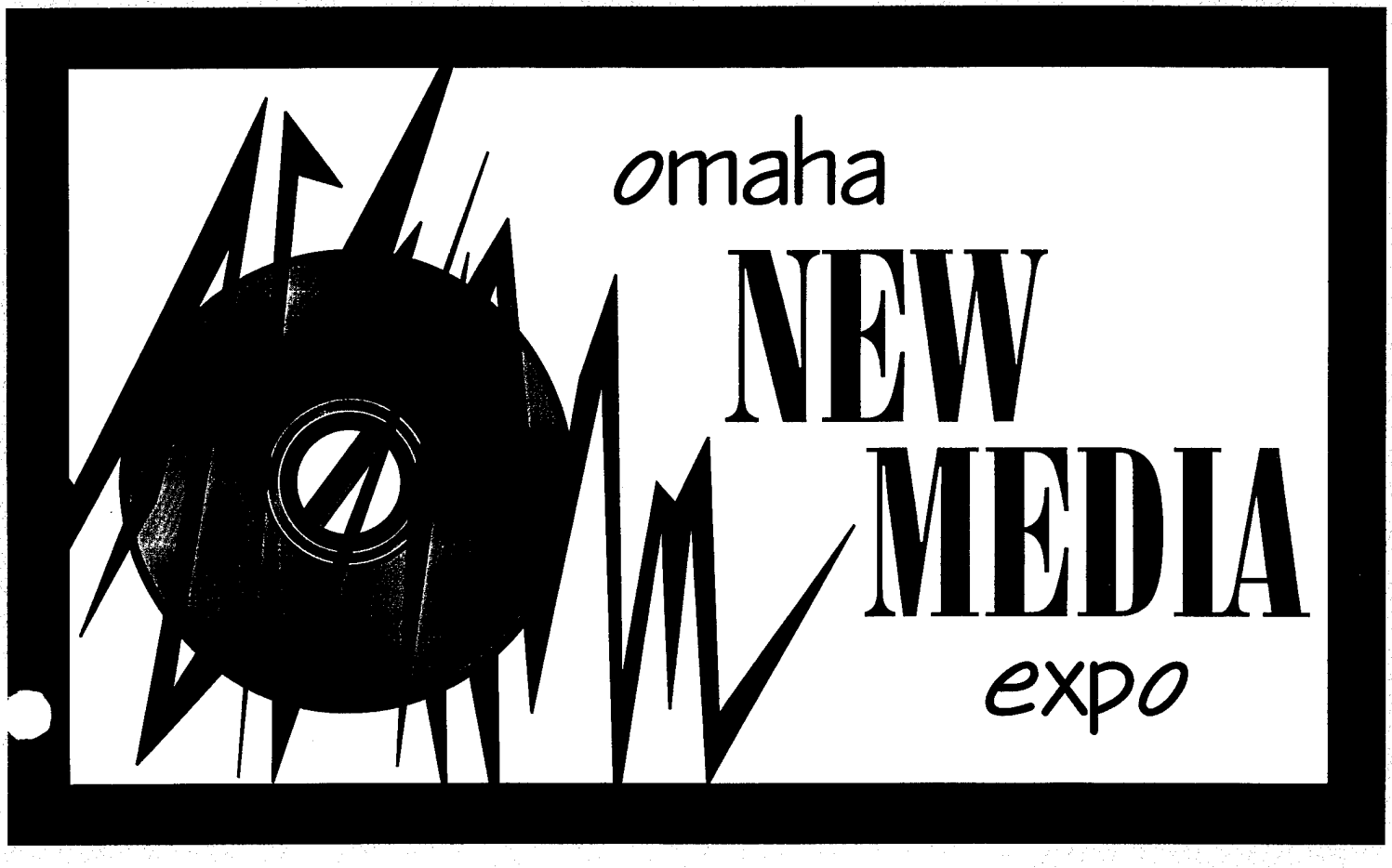
STUFF TO BE USED FOR BRIEFINGS BY ARPA

PICTURE
SCHEDULE
BACKGROUND ; HISTORY
TECHNICAL APPROACH
OBJECTIVES OR GOALS
TECHNICAL CHALLENGE & KEY IDEAS

ADDRESSES

www.omaha.org

Mid-America's Premier Interactive Multimedia Conference



January 30-31, 1996

Red Lion Hotel & Convention Center

Omaha, Nebraska

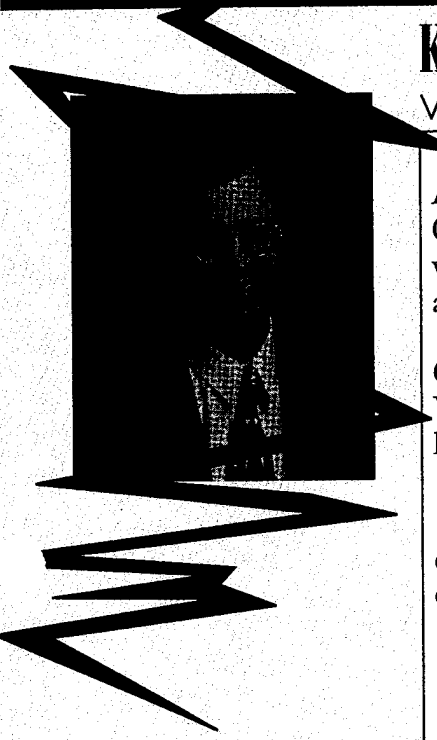
Keynote Speakers: George Gilder, Kevin Kelly & Roger C. Schank

Favorably Impact Your Bottom Line using New Media. **How?** By hearing nationally known speakers provide their insights on using multimedia, by attending application-oriented breakout sessions, by seeing a hands-on gallery of applications and by viewing a display of media innovations. Explore the basics of multimedia and new media from an applied business, education and training perspective. Learn how you can move your organization forward into the 21st century!

KEYNOTE SPEAKERS

Ken Christie - Opening Speaker

Vice President of Marketing for the Interactive Multimedia Association



Ken Christie is Vice President of Marketing for the Interactive Multimedia Association, the oldest and most active trade association devoted to multimedia. Christie guides the association's marketing and communications strategies, as well as directs all marketing and membership programs. He also serves as a key advisor to the IMA Board of Directors.

Ken's 17 years of experience includes sales positions with Truevision, Inc., Commodore Business Machines, Pioneer Electronics and Nebraska Interactive Video and three years with Walt Disney Productions, where he created 90 linear and interactive videodisc programs for the EPCOT Center.

Interactive Multimedia Association (IMA)

Organized in 1987, IMA's mission is to promote the growth of its member companies through programs and services designed to foster the development of robust multimedia markets. IMA initiatives and activities serve to:

- bring buyers and sellers of multimedia products together;
- simplify technology for the end user, thereby assuring buyer confidence and excitement; and
- provide information and context on legislative and market developments affecting its member companies.

Kevin Kelly

Executive Editor of WIRED Magazine

Kevin Kelly focuses on the individuals, companies and ideas that are transforming our world. He is the executive editor of WIRED Magazine, known as "the Rolling Stone" of computer magazines, and was involved in the 1993 launch of the magazine. In 1994, WIRED won the National Magazine Award for General Excellence, a rare honor for a new publication.

Kelly wrote "Out of Control: The Rise of Neo-Biological Civilization." This book suggests that machines, the economy and all large human-made inventions are becoming biological. Fortune magazine called it "essential reading for all executives."

From 1984 to 1990, Kelly was the publisher and editor of the Whole Earth Review, a journal of unorthodox technical news. This small, yet influential, journal consistently published trend-making topics, such as virtual reality, ecological restoration, the global teen-ager, Internet culture and artificial life.

George Gilder

Editor of Forbes ASAP

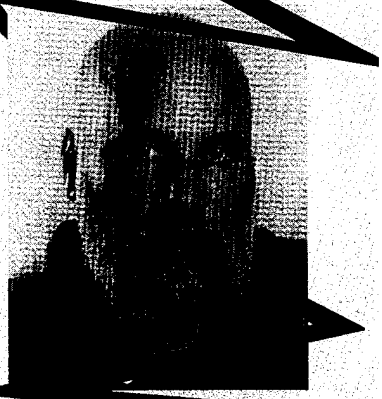
A senior fellow at the Discovery Institute in Seattle and the founding editor of Forbes ASAP, George Gilder has great ideas about future computers and their impact on you. He believes future computers will be tools that you can use to harness your full imaginative and sensory faculties. While creating a colorful picture about future technologies, he helps you achieve a greater potential by showing ways to:

- Make communications technology a chief preoccupation and source of profits for information entrepreneurs;
- Rally business behind a political program that will unleash technology's power sooner; and
- Increase your organization's infrastructure to lift technology to a higher plane.

Gilder's book, "Microcosm," explains the roots of the new electronic and communications technologies and maintains that the law of the microcosm requires decentralization of both business and government in data processing, manufacturing, telecommunications and even defense. Gilder shows how the new technology will transform the office, the factory and consumer electronics as computers make television obsolete. His most recent book, "Telecosm," looks at the opportunities associated with the Information Superhighway.

Roger C. Schank

Director of the Institute for the Learning Sciences



Roger C. Schank is an artificial intelligence guru and a significant leader in multimedia interactive learning. He stresses the value of learning through developing skills rather than perfecting routines and applying the benefits of "just-in-time" training to your setting.

He is perhaps known as much for his direct speech as for his work in creativity, cognitive science and education. Schank provides insights into ways you can improve training programs while reducing costs, maximize learning by providing information when it is required and adopting new teaching techniques that consider the way the mind learns.

A strong critic of today's education system, his message is equally convincing to audiences from corporate offices, the factory floor and other avenues of daily life. His approach to training involves helping people learn by doing and sharing the experience of experts. This effort has led to his highly successful role as a teacher, consultant, lecturer and developer of extremely powerful and effective computer training tools.

As the Director of the Institute for Learning Sciences, he studies language, thought and memory to gain insight into human processes and models these processes into software that emulates human reasoning, planning, learning and conversation. He focuses on skills rather than facts, wraps stories into simulated environments and emphasizes better listening as a part of the learning process.

AGENDA

Omaha New Media Expo

TUESDAY, JANUARY 30, 1996

8:30 - 9:00 a.m. **Opening Speaker - Ken Christie,** Vice President of Marketing, Interactive Multimedia Association

9:00 - 10:00 a.m. **Keynote Speaker - George Gilder,** Editor, Forbes ASAP

10:00 - 10:30 a.m. **Break**

10:30 a.m.- Noon **Breakout Sessions**

The IMA Multimedia Boot Camp

Whether you're a raw recruit or a hardened multimedia veteran, this session is for you. Learn how to navigate the ever-changing environment of interactive multimedia and understand the relationships between technology providers and distributors and the creators and owners of multimedia content. Get a rapid orientation on various forms of multimedia delivery, end-user target markets, new technologies on the horizon and key issues affecting multimedia market growth.

Presenter: Ken Christie, Vice President of Marketing, Interactive Multimedia Association.

Teaching and Technology: Trends for Tomorrow

See four innovative multimedia projects created in partnership with leading corporations for use in K-12 classrooms. Melding creative multimedia with the Internet produces model learning environments that use exciting new information technologies. Through these projects, you'll learn how access to advanced technologies can help generate new trends in teaching and learning. This session is sponsored in part by the Eastern Regional Math and Science Coalition, Project TEAM-Internet (UNO) and the Metropolitan Omaha Education Consortium.

Presenters: Neal Topp, Assistant Professor of Teacher Education, University of Nebraska at Omaha.
Neal Grandgenett, Assistant Professor of Teacher Education, University of Nebraska at Omaha.

Putting Your Company on the MAP

View the Multimedia Access Prototype (MAP), an on-line service that will build high-quality multimedia bridges to U.S. Government geographic information sources. MAP can search a variety of data sources, convert data into usable information and present it in a visually enhanced interactive format. Explore the opportunities available for accessing and repackaging MAP information into easy-to-use formats. The MAP operational model offers a process for developing new, profitable, high-tech projects. Developed under a grant from the federal government's Advanced Research Projects Agency, the MAP system was conceived and built by a "virtual company" made up of experts from seven technology firms and universities in Omaha.

Presenter: Doug Perry, Multimedia Director, Applied Information Management Institute

Noon - 12:30 p.m. **U S WEST Broadband Network to the Home**

Omaha is the site for the world's largest test of broadband, interactive television services. U S WEST is offering 45,000 homes the chance to buy new digital services, including video-on-demand. U S WEST will present the early results of this exciting project and discuss ideas for future product and service offerings. Learn how business can capitalize on this new information network! Don't miss the special on-site, hands-on demonstrations. Stop at U S WEST's Expo Booth for full details.

Presenter: U S WEST

Noon - 2:00 p.m. **Lunch in Exhibitor's Showcase**

2:00 - 3:30 p.m. **Breakout Sessions**

The Digital Classroom

Empower employees and cut training costs! By marrying multimedia technology with your local or wide-area computer network, you can present cutting-edge training programs that are consistent in quality, economical to deliver and customized to meet the needs and schedules of your audience. Step through the process of setting up your own digital classroom, including how to incorporate full-motion video!

Presenters: Jim Fox, Director of Information Services, Union Pacific Railroad
Tom Gerber, LAN Multimedia Project Manager, Union Pacific Railroad

Finding Success on the Internet: Business Cases

Want to increase profits by getting on the Internet? Four local businesses present details on how they succeeded in crafting their own high-quality multimedia presentations for the Internet. Featured in this session:

- **Omaha Steaks International** - profitable Internet site is an integral component of their highly successful marketing efforts.
- **Applied Information Management Institute (AIM)** - has created information technology projects such as the MAP Project.
- **The Greater Omaha Chamber of Commerce** - interactive CD ACCESS OMAHA introduces businesses and individuals alike to the "Big O" using over 1,000 full-color pictures and full-motion video inserts.
- **Tesseract Computing** - artificial intelligence technology to solve telephone network and communications problems.
- **First National Bank of Omaha** - pioneer development of secure methods for electronic commerce.

Getting Started in Multimedia

Thinking about using multimedia for marketing, training or other purposes but don't know where to start? In this session, you'll learn what interactive multimedia is, what it takes to get started, how to plan your multimedia project and what to consider when determining its content. Personal computers let you capture the power of sight, sound and interactive communication. You can't afford to be left behind while your competitors move forward. Don't miss this chance to learn the basics.

Presenter: Sue Papineau, Training Coordinator, Nebraska Business Development Center

3:30 - 4:00 p.m. **Break/Exhibitor's Showcase**

Omaha New Media Expo

AGENDA

...00 - 4:30 p.m. **Day One Conference Wrap Up**

4:30 - 7:00 p.m. **Reception/Exhibitor's Showcase**

5:00 - 6:00 p.m. **Union Pacific Railroad National Dispatch Center Tour or STRATCOM Underground Command Center Tour at Offutt Air Force Base**

WEDNESDAY, JANUARY 31, 1996

9:00 - 10:00 a.m. **Keynote Speaker - Kevin Kelly,** Executive Editor, WIRED Magazine

10:00 - 10:15 a.m. **Break**

10:15 a.m. - Noon **Breakout Sessions**

Learning by Doing - Computer Software & New Media for More Effective Training

The Institute for the Learning Sciences at Northwestern University is an interdisciplinary center dedicated to transferring new software technology from the laboratory to practical applications for use in businesses and schools. Advanced research in cognitive science, artificial intelligence and education is the foundation for ILS-designed learning software that takes into account how people actually learn, remember and reason. The HUMAN RESOURCES MANAGEMENT model, which contributes to a savings of $10 million annually for Anderson Consulting, will be featured as an example of the Institute's work.

Presenter: Institute for the Learning Sciences

The Art of Multimedia: Multimedia Imaging and Design

Electronic imaging and graphics offer an exciting array of technical and creative tools for producing art for aesthetic and commercial use. Learn how to take text and graphic components and meld them into an exciting multimedia presentation using authoring tools Asymetrix ToolBook and Director.

Presenters: Gary Downing, Electronic Imaging Graphics faculty, Metropolitan Community College
Jim Butkus, Photography faculty, Metropolitan Community College
Christopher Burnett, Photography/Video faculty, Kansas City Art Institute

Industrial Strength Tools for WWW Development

A 700 page Web site unearths daunting problems. This session deals with issues such as cross platform portability, lowest common denominator constraints, multiple browsers, diverse client configurations, coordinating multiple developers, referential integrity, HTML maintainability, content expiration sensitivity, structural extensibility, change control, robust directory structures, layout effectiveness, consistency and "banana" life cycles. Discussion focuses on addressing these issues through selection of standards and acquisition of tools. Learn the order of magnitude productivity improvements achieved with acquisition of tools that generate HTML pages. This session is not for rookies!

Presenter: Tim Hammelman, Associate Director, AIM Institute

Noon - 1:00 p.m. **Lunch**

1:00 - 2:00 p.m. **Keynote Speaker - Roger C. Schank,** Director, Institute for the Learning Sciences

2:00 - 2:15 p.m. **Break**

2:15 - 4:00 p.m. **Breakout Sessions**

Computer-Based Training (CBT) and Customized Multi-Media Training (MMT)

CBT Systems will discuss the need for computer-based training, deployment issues and the development model. An actual CBT product will be demonstrated. Dunloe International will discuss the business case for multimedia training and the philosophies on producing MMT. The award winning Multi-Media Mastery Test, Commquest, developed for Atlantic Bell, will be examined.

CBT Systems is an interactive education software vendor based in Dublin, Ireland, with U.S. headquarters in San Francisco. Dunloe International is based in Chicago.

Presenters: Ron Reichert, CBT Systems
Gary Glatz, President, Dunloe International

Selling the New Media Project Internally

Benefit from the real-world experiences of a local project manager working to integrate multimedia technologies into the firm's existing business communications strategies. Learn what multimedia can and cannot do for you and the cost of multimedia versus other media alternatives. See how effective multimedia creates more effective communication, increases sales and lowers training costs. Learn how to justify the multimedia project as an investment for your company.

Presenter: Geri Michelic, Vice President of Corporate Communications, Inacom, Inc.

Internet Marketing: How to Develop an Effective Web Site Presence

Learn to design and maintain a compelling, attention-grabbing home page on the World Wide Web. View exciting, "on-line" demonstrations that tackle the issues of creativity, content and information "shelf-life." Obtain information on the basics of effective Internet marketing.

Presenter: Doug Perry, Multimedia Director, Applied Information Management Institute

4:00 - 4:30 p.m. **Day Two Conference Wrap Up**

EXHIBITOR'S Showcase

Stop and see the exciting array of multimedia products and services at our Exhibitor's Showcase. Exhibition hours are from 10 a.m. to 7 p.m. Tuesday. The exhibition area will host the Tuesday lunch and evening reception.

GALLERY of Applications

Get hands-on experience with many of the interactive multimedia applications featured throughout the Omaha New Media Expo. Our Gallery of Applications will be open both days. Conferees can surf business, marketing, education and public sector applications.

Today's business opportunities are cruising the Information Superhighway.

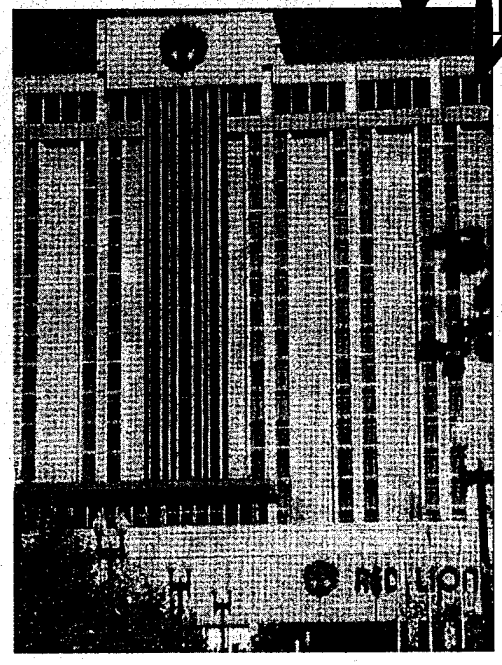
Find out how new media can improve your business' mileage by attending the Omaha New Media Expo, January 30-31, 1996.

The Omaha New Media Expo, Mid-America's premier interactive multimedia conference, will focus on new media's role in business, education, training and enterprise operations. You can explore the basics of multimedia and new media or speculate the future with experts.

Industry estimates that multimedia is a $14 billion market worldwide today and will grow to $30 billion by the year 2000. Don't miss this chance to learn how to take advantage of the exciting opportunities for business and education.

The Omaha New Media Expo will show you how to turn the latest technology into a driving force.

RED LION Hotel & Conference Center



A block of rooms at the Red Lion Hotel has been reserved, until Jan. 8, 1996, at a discounted price for conference participants. After that time, rooms will be sold at rates based on space availability, so reservations should be made without delay. The discounted rate, excluding taxes, is $89 for single or double occupancy.

Room reservations need to be made directly with the Red Lion Hotel by calling (800) 547-8010 or (402) 346-7600. When you are making your reservations, it is important to emphasize that you are with the Omaha New Media Expo to ensure your discounted rate.

Non-smoking rooms are available on a limited basis.

The Red Lion offers complimentary transportation to and from Omaha's Eppley Airfield, only a 10-minute ride from downtown.

Tuesday, January 30 and
Wednesday, January 31, 1996

Red Lion Hotel & Conference Center
Omaha, Nebraska

Omaha New Media Expo REGISTRATION

Who should attend the Omaha New Media Expo?

- Business decision makers
- Information technology managers
- Specialists in educational media
- Product developers
- Educators at all levels
- Corporate training officers
- Strategic planners
- Entrepreneurs
- Publishers
- Researchers
- Marketing and communication professionals
- Consultants

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METROPOLITAN COMMUNITY COLLEGE

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CENTER FOR MANAGEMENT OF INFORMATION TECHNOLOGY

Please Register Me Now

Name _____ MC# from mailing label

Title _____

Organization _____

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City _____ State _____ Zip _____

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_____ $425 **Full Conference Registration Fee**
(includes both days, all sessions, materials, refreshments, lunch and Exhibitor's Showcase)

_____ $95 **Exhibitor's Showcase Pass**
(Tuesday, January 30th 10 a.m.-7 p.m. includes buffet lunch and reception)

Payment Method

Credit Card

Charge $_____ to my ❑ American Express ❑ VISA ❑ Mastercard

Card Number _____ Expires _____

Cardholder's Name _____

Check

❑ Check enclosed for $ _____
(payable to Nebraska Business Development Center)

Tours

I am interested in the ❑ STRATCOM Underground Command Center Tour
❑ Union Pacific National Dispatch Center Tour

FAX (402) 595-2385 or mail to: **University of Nebraska at Omaha**
Phone (402) 595-2381 **Nebraska Business Development Center**
1313 Farnam, Ste 132,
Omaha, NE 68182-0248

If you need to cancel your registration, you will receive a full refund by calling the Nebraska Business Development Center no later than Friday, Jan. 12, 1996. If you cancel your registration after that date, you will receive the conference materials and a 50 percent refund. You may transfer your registration and send a substitute if you cannot attend.

If you have any questions, call Sue Papineau at (402) 595-2381 or email Sue at papineau@cwis. unomaha.edu or visit the Omaha New Media Expo Web site at www.omaha.org/mmce.htm.